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TWENTY-FIFTH YEAR

# The Heating and Ventilating Magazine

*A Monthly Journal of Engineering Progress*

XXV. No. 12.
0 a year. 30 cents a copy.

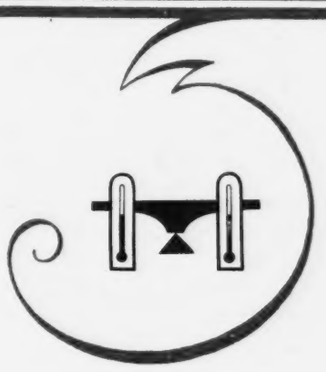
DECEMBER, 1928

Heating & Ventilating Magazine Co.
386 Fourth Avenue, New York.

## Announcement

What we believe to be the most important advance in the art and science of steam heating since the development of the original Webster Vacuum System is being exhibited to the public for the first time at the New York Power Show. See this exhibit.

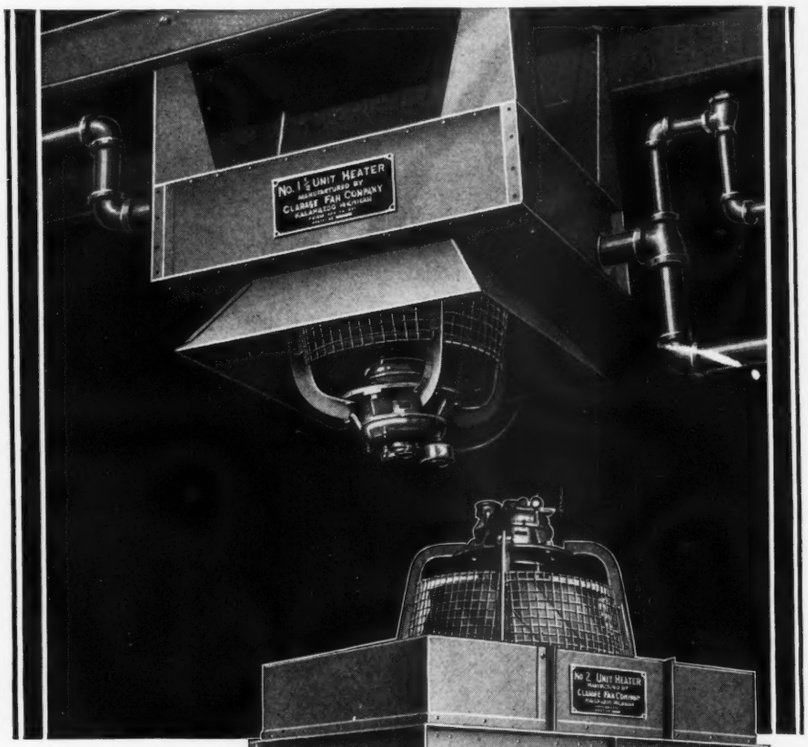
WARREN WEBSTER & COMPANY
Camden, N.J. 52 U. S. Branch Offices



At booths 225-226, Seventh National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York City, December 3rd to 8th.

- since 1888
Webster
*Systems of Steam Heating*

# Efficient Results Depend Upon Rapid, Uniform Distribution




*At right*—Clarage Ceiling Type Unit Heater. Note deflector, which directs heated air downward. As heated air descends, it spreads out cone-shaped over working area.

THE Clarage Unit Heater is equipped with a centrifugal fan mounted outside the heater casing, as shown in the illustrations.

In factory heating, where efficient results depend primarily upon a rapid, uniform distribution of heated air, the importance of this unique design cannot be over-estimated. This design enables the Clarage Unit Heater (and only the Clarage Unit Heater) to deliver heated air in all horizontal directions and at high velocity.

With Clarage Unit Heaters, comfortable temperatures are easily maintained—maximum economies effected. First, because the delivery of heated air in all horizontal directions means that every part of the working area of the building receives an equal, uniform supply of heat—no parts slighted. Second, because the heated air, being forced out at high velocity, proves effective even at relatively great distances from the heater.

To select Clarage Unit Heaters is to have a satisfactory installation, and to save on both first and operating costs. If you have any type or size of industrial heating problem, it will pay you to write us for complete details.

*Above*—Clarage Floor Type Unit Heater. Both floor and ceiling types are built in such sizes as to meet all industrial heating requirements.

CLARAGE FAN COMPANY
KALAMAZOO, MICHIGAN
*Sales Engineering Offices in Principal Cities*

# CLARAGE
## UNIT HEATERS

**with AEROFIN STANDARD EQUIPMENT**

All Clarage Unit Heaters utilizing steam or hot water have Aerofin (The Standardized Light Weight Heater) as the heating element. Aerofin is made of copper and brass—non-corrosive, imperishable, light-weight. It is highly efficient, guaranteed steam and water tight. Engineers endorse it.

# KEWANEE STEEL RIVETED BOILERS

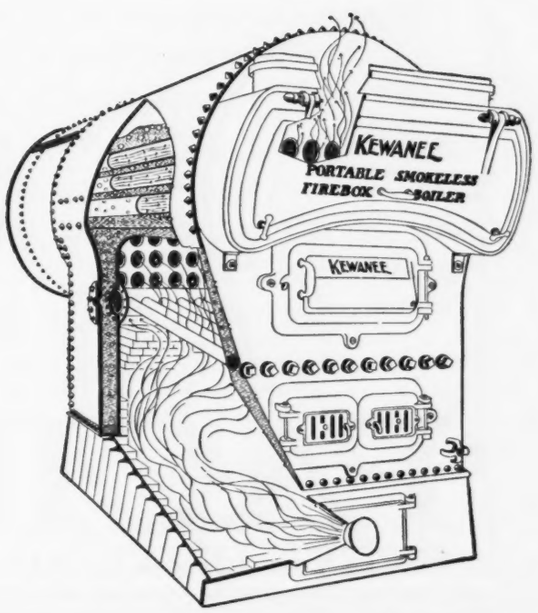
## *Equally Efficient with Coal or Oil*

**If you intend to burn oil** in a boiler, three things are vital: **Unimpeded Circulation**—a **High Firebox**—and **Great Strength.**

Oil produces a quick, hot fire: **Free and Rapid Circulation** is necesssary in order that the heat may be absorbed by the water: Burning oil requires lots of air—demanding a firebox of generous proportions. And naturally the sudden temperature changes from burning oil put unusual stress on the firebox—so **Great Strength** is needed.

All of these essentials are provided by Kewanee design and steel riveted construction.

The water tube grate and header is built into Kewanee Smokeless Boilers in the high temperature zone of the firebox directly above the oil burner. The pumping action furnished by the rapid formation of steam in these tubes causes forced circulation of the whole large waterways. This circulation sweeps the steam bubbles from the heating surfaces and thus maintains the most effective condition for the transfer of heat.




***Ask for special data on burning oil in Kewanee Boilers***

**KEWANEE BOILER CORPORATION**

*Kewanee, Illinois* *Branches in 40 Principal Cities*

STEEL HEATING BOILERS RADIATORS WATER HEATERS
TANKS AND WATER HEATING GARBAGE BURNERS


THE HEATING AND VENTILATING MAGAZINE, published by THE HEATING AND VENTILATING MAGAZINE CO., at 386 Fourth Avenue, New York, N. Y. Subscription rates: United States, $2.00; Canada, $2.50; Foreign, $3.00. Single copies, 30 cents. Vol. XXV, No. 12, December, 1928. Entered as second-class matter, April 18, 1925, at the Post-Office at New York, N. Y., under the Act of March 3, 1879.

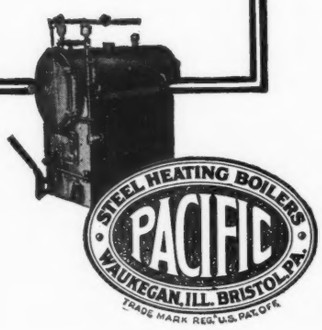
# The Choice of Successful Operators

Real estate operators of New York City make certain the success of their buildings before they start work. The buildings are large and must be rented quickly to assure profits.

These operators have found a good friend in Pacific Boilers—equipment that gives heat economically at the lowest possible maintenance cost.

The up-to-the minute New Yorker scans carefully such evidences of value. That is why leading operators use Pacific Boilers. They win tenants and buyers.

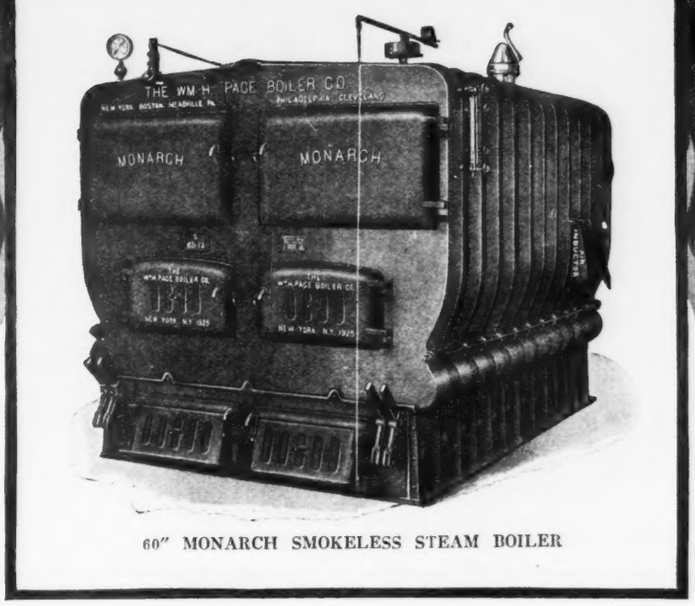
*The Park Royal*, 73rd Street, New York, shown here, is the fourth of the huge apartments built by the Lapidus Engineering Co., in New York City in which Pacific Steel Boilers were used.




PACIFIC STEEL BOILER CORPORATION
Waukegan, Ill., Bristol, Pa.
*Sales Offices in 58 Cities*
Division of U. S. Radiator Corp., Detroit, Mich.

# PACIFIC
## STEEL HEATING BOILERS

# FOR HEAVY DUTY

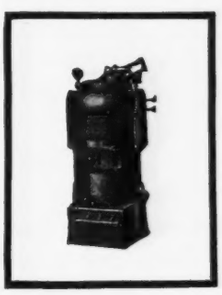



60" MONARCH SMOKELESS STEAM BOILER

MONARCH Water Tube Square Boilers are built for heavy duty, of cast iron, and with proper attention will outlast the buildings they are installed in.

With deep combustion chamber and long triple level fire travel, Page Monarch Boilers lend themselves perfectly to the high combustion of gas or oil, and are most economical in fuel consumption when burning hard or soft coal, of any size and grade obtainable.

Priced right to show you a profit. Write for catalog and prices.



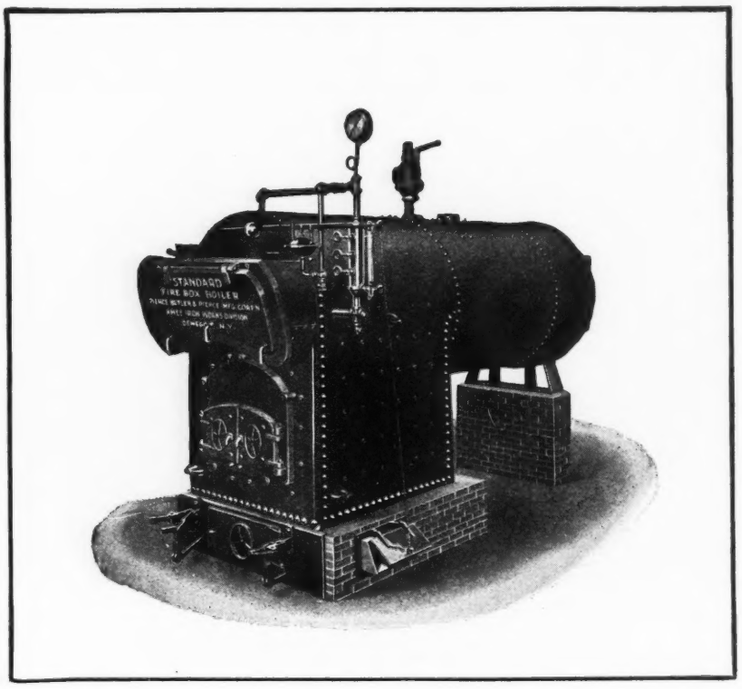
## The Wm H Page Boiler Co

General Offices: 200 MADISON AVENUE, NEW YORK CITY

*BRANCH OFFICES AND WAREHOUSES:*

BOSTON, 123 Beverly Street
CLEVELAND, Rose Building
BALTIMORE, 502 St. Paul Street
PHILADELPHIA, 1126 Washington Ave.
WASHINGTON, 1117 - 15th Street, N. W.
Factory: MEADVILLE, Pennsylvania

# AMES




FIREBOX HEATING BOILERS

## AMES IRON WORKS

*Division of*

PIERCE, BUTLER & PIERCE

MANUFACTURING CORPORATION

*Main Office and Works*

OSWEGO, N. Y.

*General Sales Offices*

41 EAST 42nd STREET, NEW YORK CITY

# Lost! *A heating contract!* Found! *A way to get it!*

Of the last ten contracts you bid on, how many did you get? Why did you lose the others?



Take a small roll of paper. Hold it slanting upward. Light it in the middle. Flames dart up and burn the upper half long before your fingers even feel the heat from fire creeping down. The Spencer Gable-Grate makes fire burn up-hill, the way it burns easiest and best.

It is a toss-up, this competitive bidding. Someone may forget to figure in a few valves, ells or even an hour or two of labor, and you have lost a contract because of a competitor's mistake.

When you bid, you estimate on practically the same thing as all of your competitors. There is only one way for your prospective customer to pick out a contractor for his job—and that is to select the lowest bidder.

Yet you can make yourself stand head and shoulders above competition. You can show every prospect that you are thinking of his pocketbook as well as your own. With every competitive bid you make, submit an alternative bid on a Spencer Heater.

Sugar poured from a spoon piles up in a heap. Take some away from the bottom of the heap, and more rolls down. Coal does the same. Fire in the Spencer Gable-Grate takes fuel away from the bottom and more automatically rolls down to keep the fire-bed uniform in depth.

Show prospects how it works. Show them that it burns small sizes of coal and coke, fuels that save as much as half the annual fuel bill. Show them how it needs attention only once or twice a day, and gives a better, more uniform heat.

Spencer Heaters have been making extra business and extra profits for heating contractors for thirty years. The new book, "The Spencer Co-operative Selling Plan," is free to progressive heating contractors. Write for your copy and learn how you can lift your business above competition, and multiply your sales and profits. Spencer Heater Company (*Division of Lycoming Manufacturing Company*), Williamsport, Pa.

SPENCER
*steam, vapor or hot water*
HEATERS

# What you can expect from the National Radiator Corporation

*Corcoran Courts Apartments, Washington, D.C.*
*Architect: Harvey Warwick.*
*Builder: The Cafritz Construction Company.*

A COMPREHENSIVE line of outstanding and exceptional products that will efficiently meet your every heating need.

Performance, conclusively demonstrated over a period of years, on diversified heating applications of every character.

Service that gives new meaning to a much-abused word.

These things you can expect, and will receive, when you use National Radiator Products. Products which comprise the outstanding achievements of six great companies, backed today by a united responsibility, and widely distributed through a great chain of plants, offices and warehouses.

In "National Radiator Products," you can expect quality, service, and satisfaction for your customers, and yourself.

## NATIONAL RADIATOR CORPORATION

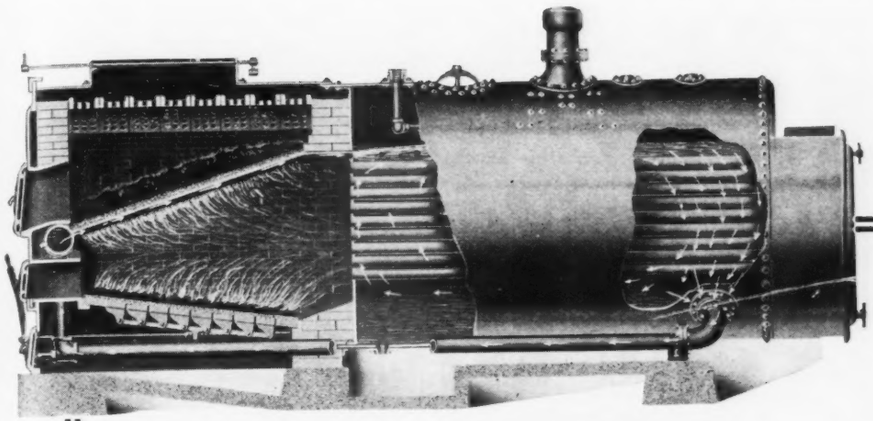
MANUFACTURER OF RADIATORS AND BOILERS

UNION · NIAGARA · GURNEY · UTICA · CONTINENTAL · NATIONAL
NATIONAL PRODUCTS

*Nine Plants devoted to National Service through these Branch Offices and Warehouses:*

Baltimore, Md.—2600-2622 Matthews St.
Boston, Mass.—93-97 Oliver St.
Buffalo, N. Y.—259-265 Delaware Ave.
Chicago, Ill.—2445 N. Keeler Ave.
Cleveland, Ohio—935 E. 63rd St.
Cincinnati, Ohio—3530-36 Spring Grove Ave.
Indianapolis, Ind.—431 W. Georgia St.
Johnstown, Pa.—221 Central Ave.
Milwaukee, Wis.—124-130 Jefferson St.
New York, N. Y.—55 W. 42nd St.
Omaha, Neb.—108-112 S. Tenth St.
Philadelphia, Pa.—121 N. Broad St.
Pittsburgh, Pa.—1509 Arrott Bldg.
Richmond, Va.—3032 Norfolk St.
St. Louis, Mo.—1042 Central Industrial Ave.
Washington, D. C.—2205 Fifth St., N. E.

AERO



This illustration shows a 12,000 sq. ft. Stanwood Smokeless Boiler. Water line 61". Height from floor to top of shell 79".

SEE OUR CATALOGUE IN SWEETS

# *Low head room permits economical installation*

Where low water line is required and head room is limited — The Stanwood Boiler should be your decision. The low water line found in Stanwood compact steel riveted boilers requires relatively little head room.

The water line of 48 to 75 inches necessitates little or no excavating. Begin to figure savings here. This compactness which permits economies in installation is why Stanwood Smokeless Boilers are so often specified.

And in operation and maintenance as well do Stanwood Boilers offer minimum expense. Absence of mudlegs, staybolts and crownsheets eliminate costly repairs frequently encountered when these evils of boiler construction are used.

Speedy water circulation prevents accumulation of sediment and increases boiler efficiency and capacity. Get the complete facts about Stanwood heating boilers—write Dept. D-128, giving pressure and horsepower desired.

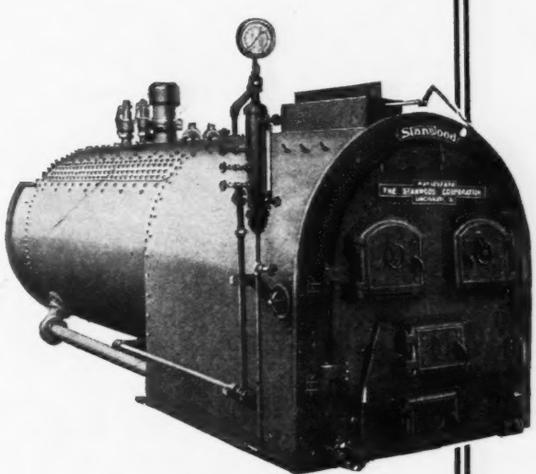
**The STANWOOD CORPORATION**

*Manufacturers also of Horizontal Return Tubular Boilers, Stacks, Breechings and Tanks.*

**Cincinnati, O.**

**Est. 1891**

Regularly built in sizes from 29 to 250 H.P. (3500 to 31000 sq. ft. steam radiation) for working pressures of 15, 100, 125 and 150 lbs. Built for higher pressures if desired.



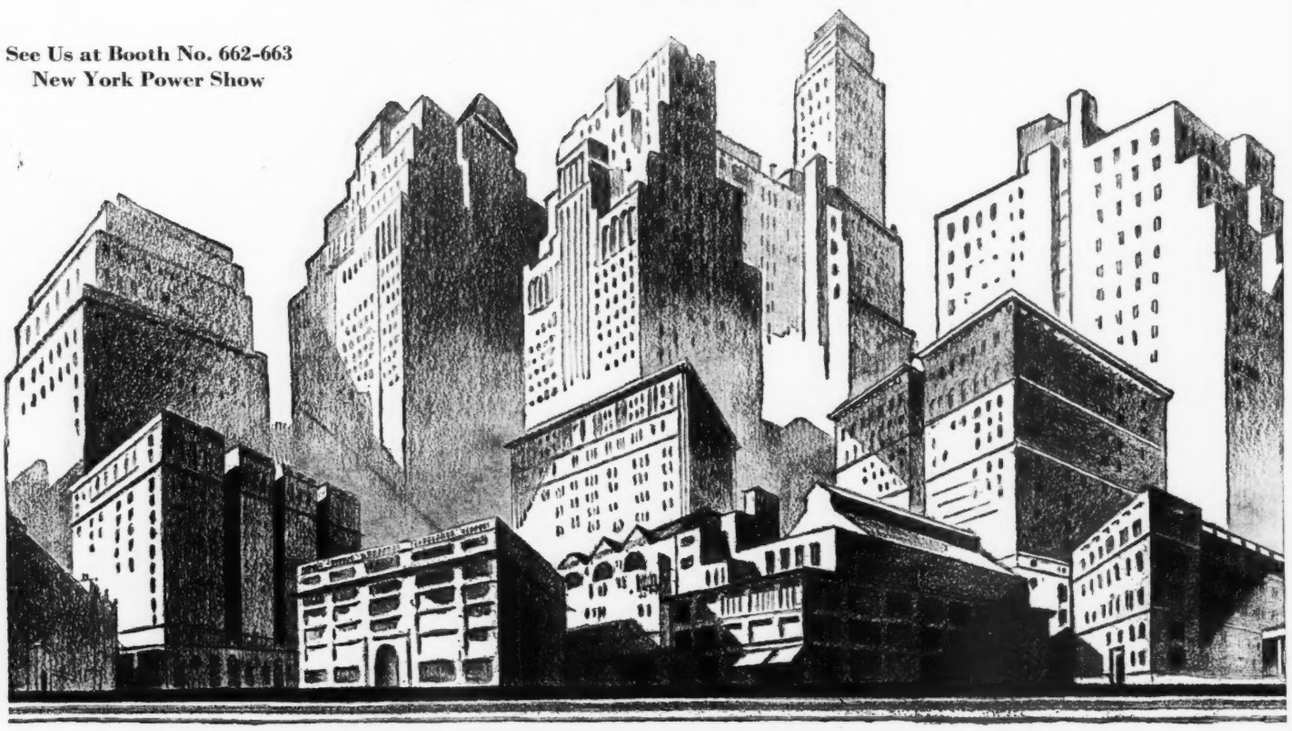
*ALL STEEL RIVETED CONSTRUCTION*

# Stanwood Smokeless Boilers

Sweeping claims are made in behalf of Fitzgibbons Steel Boilers. ▲ It is claimed that they are more efficient, saving twenty to forty per cent of fuel costs. ▲ It is claimed that they are more easily installed, serve longer, require less attention and cost practically nothing for maintenance. ▲ You have the opportunity to investigate these claims. We urge that you hear the testimony of owners and contractors who know that these claims are true.

# IN YOUR MINDS YOU ASK FOR--- --- PROOF

See Us at Booth No. 662-663
New York Power Show



## HERE IS THE EVIDENCE!

**Above is illustrated recent New York construction, including the Pennsylvania Building, Court-Montague Building, Madison Square Garden, Franklin Simon Building, Sherman Square Building, Fashion Center Building, and others of similar distinction. All are heated with**

# FITZGIBBONS STEEL BOILERS

**FITZGIBBONS BOILER CO., INC., New York · Representatives in Principal Cities**

# TITUSVILLE

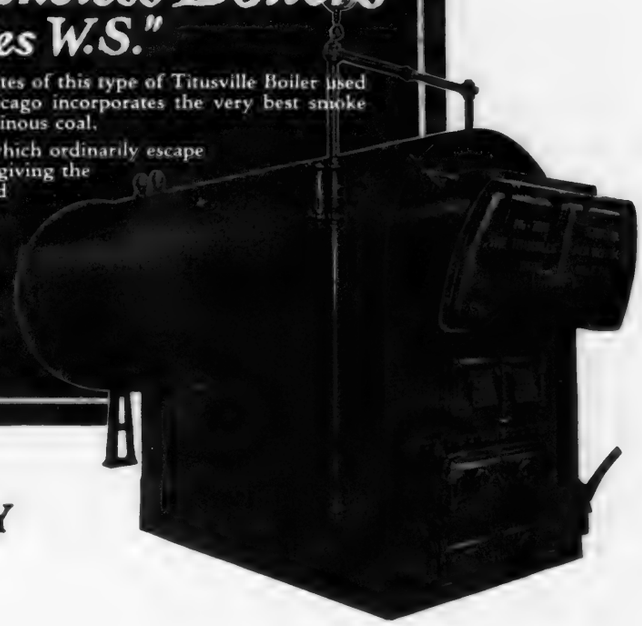
*Titusville Type WS boilers are installed in this new ultra-modern Chicago apartment building.*

## Downdraft Smokeless Boilers
### "Series W.S."

¶ The especially designed downdraft grates of this type of Titusville Boiler used in the Gordon Apartment Building in Chicago incorporates the very best smoke eliminating device yet developed for bituminous coal.

¶ The percentage of combustible gases which ordinarily escape up the smokestack are thoroughly burned giving the maximum heat units per pound of coal and assuring the utmost fuel economy.

¶ Heating engineers and building contractors will find it profitably interesting to investigate the many superior advantages of this electrically welded boiler. It is a new and progressive product of a pioneer boiler manufacturer of national repute.



*Sales Offices:*

New York
152 W. 42nd Street

Chicago, Ill.
111 W. Monroe Street

Detroit, Mich.
204 Owen Building

Buffalo, N. Y.
Marine Trust Building

Washington, D. C.
626 Woodward Building

Pittsburgh, Pa.
Farmers Bank Building

Charlotte, N. C.
705 Realty Building

Los Angeles, Calif.
940 Maple Avenue

St. Louis Mo.
401-2 Bank of Commerce Building

**THE TITUSVILLE IRON WORKS COMPANY**
**TITUSVILLE, PENNA.**

# In the YEARS to COME

ON Fifth Avenue, Michigan Boulevard, Market Street and on the thoroughfares of many of America's great cities, one may stand today and gaze in amazement at the number of great buildings. Here one sees, materially, that typical American spirit, ever striding quickly forward—reaching, climbing, planning for the years to come. And, in keeping with the architectural achievement, engineering skill has been diligently applied—the specifications for the various materials were written by far-famed architects and engineers, cooperating with industrial leaders in establishing quality.

Included with other dependable equipment are vast networks of pipe lines, behind the walls and beneath the floors. Here, in particular, there could be no compromise with the principle of high quality. Buildings constructed to stand for years to come and to give uninterrupted service through their pipe lines must contain pipe which offers the basic advantage of long life. Thus, in the selection of the tubular equipment for the Industrial Trust Company Building, one of the newest and largest of New England's skyscrapers, "NATIONAL" Pipe was specified for the major pipe tonnage.

The name "NATIONAL" on the specifications means that future service has the added protection of the "NATIONAL" Scale Free Process (partly illustrated below). This process is applied to butt-weld sizes ½ to 3-inch, and the Spellerizing Process to all sizes 4-inch and under. Both processes are designed to make this pipe more resistant to corrosive influences and give added life in the years to come.

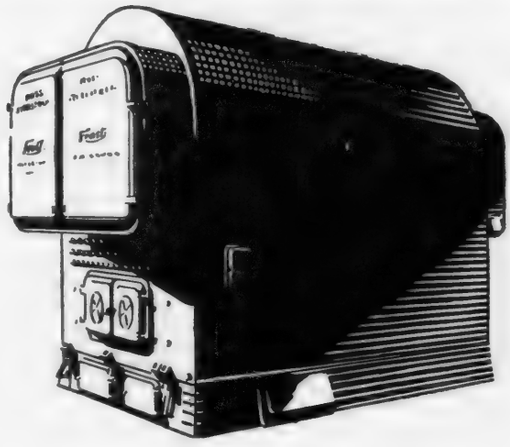
INDUSTRIAL TRUST COMPANY BUILDING
PROVIDENCE, RHODE ISLAND
*Architects:* Walker & Gillette, *Associate,* George Frederic Hall, New York City
*Engineers:* J. F. Musselman Associates, New York City
*General Contractors:* Starrett Brothers, New York City
*Heating Contractors:* General Fire Extinguisher Co., Providence, R.I.
*Plumbing Contractor:* James McMillan, New York City

**NATIONAL TUBE COMPANY, PITTSBURGH, PA.**
***District Sales Offices in The Larger Cities***

# "PAYS for itself in *efficiency*"

*M. Liebowitz and Sons' Apartments, Crown St., Brooklyn, N. Y.—2-S124 Ross Boilers, net load 20,800 sq. ft. 1-W109 3000-gallon Ross Tank Heater.*

**The newer apartments are installing ROSS STEEL HEATING BOILERS because they lower heating costs.**



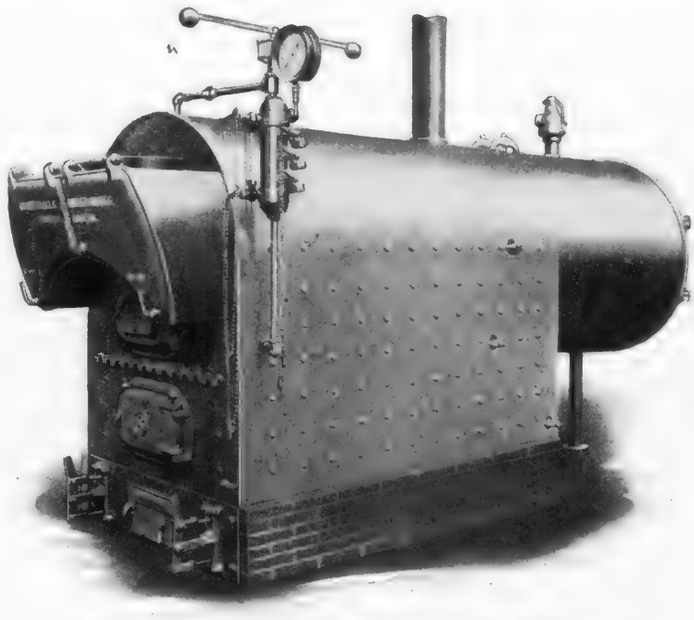
The Frost Manufacturing Co.
SINCE 1851
*Branches in most leading cities.* GALESBURG, ILLINOIS

# ROSS STEEL BOILERS

# Still another prominent structure will be heated by COATESVILLE BOILERS

INTEGRITY TRUST BUILDING
16th and Walnut Sts., Philadelphia, Penna.

*Architects—Samuel Green Co., and A. H. Lavalle, Springfield, Mass. Contractors—Geo. A. Fuller Co. Heating Contractors—Chas. E. Monday Co., Phila., Pa.*
*(Building was designed for Peyton Realty Co., Phila., Pa.)*



**A Coatesville All Steel Portable Firebox H. R. T. Boiler**

The Integrity Trust Building being built at 16th and Walnut Sts., is just one of many new Philadelphia structures which will be adequately heated by COATESVILLE ALL STEEL H. R. T. HEATING BOILERS. These Boilers are of the Series A S.-280 type, of 28,000 feet each—and are the result of nearly a half century of Boiler Making Experience; in fact, Coatesville was a "pioneer" in the All-Steel Heating Boiler business—having built such a boiler as early as 1892.

***NOTE:—We recently issued a new Series of Heating Boiler Bulletins; tell us your requirements and we'll send the proper Bulletins.***

## COATESVILLE BOILER WORKS

Boilers - Tanks - Steel Plate Work

| PHILADELPHIA | PITTSBURGH | NEW YORK | BALTIMORE | SAN FRANCISCO | BOSTON | NEWARK |
|---|---|---|---|---|---|---|
| 111 S. 15th St. | Union Trust Bldg. | 30 Church St. | Lexington Bldg. | 945 Pine St. | 141 Milk St. | 60 Park Place |

**Coatesville All Steel Heating Boilers are also sold by**

## NATIONAL RADIATOR CORPORATION

*Ten plants devoted to National Service through these Branch Offices and Warehouses:*

Baltimore, Md.—2622 Frisby Street Boston, Mass.—93-97 Oliver Street Milwaukee, Wis.—124-130 Jefferson St. New York, N. Y.—55 W. 42nd St.
Buffalo, N. Y.—259-265 Delaware Avenue Louisville, Ky.—1126 W. Breckenridge St.
Chicago, Ill.—2445 N. Keeler Avenue Cleveland, Ohio—935 E. 63rd Street Omaha, Neb.—108-112 S. Tenth St. Philadelphia, Pa.—121 N. Broad St.
Cincinnati, Ohio—Spring Grove and Elmira Avenue Pittsburgh, Pa.—1509 Arrott Building
Indianapolis, Ind.—431 W. Georgia Street Johnstown, Pa.—221 Central Ave. Richmond, Va.—3032 Norfolk St. St. Louis, Mo.—1042 Central Industrial St.
Washington, D. C.—2205 Fifth Street, N. E.

# COIL

## STEEL HEATING BOILERS AND WATER HEATERS

If desirable, Coil Oil Burning Boilers can be fitted with grates, shaking apparatus, etc., in thirty minutes time. Write for Catalog.

BY specifying Coil Boilers to your customer you can effect a savings of from 25 to 40 per cent. for him on fuel bills.

## FOR OIL BURNING

**The reason Coil Boilers are so economical in the use of fuel and yet give even greater heating efficiency, is no mystery.**

**They are so designed that they present more heat absorbing surface to the view of the flame than the average heating boiler.**

**Hundreds of satisfied users have written us telling what the Coil Boiler has saved for them. Profit by their experience. Use Coil every time.**

*Send for our catalog.*

MONITOR BOILER COMPANY

**1505 RACE ST., PHILADELPHIA, PA.**

# FOR THE TALL BUILDING

## SYLPHON PACKLESS EXPANSION JOINTS ARE **STEAM TIGHT** and FREE FROM JAMMING RISK

### *Eliminate Story Height Space Wasting "Expansion Loops"*

THE dependable Sylphon Bellows as the heart of the Sylphon Packless Expansion Joint provides a continuous yet flexible barrier to steam escape. The Sylphon Packless Expansion Joint easily installed in the vertical riser, allows absolutely no leakage, and operates for years without attention.

It obviates the use of packed or "sliding sleeve" expansion joints almost impossible to repack in the case of a riser concealed in furring.

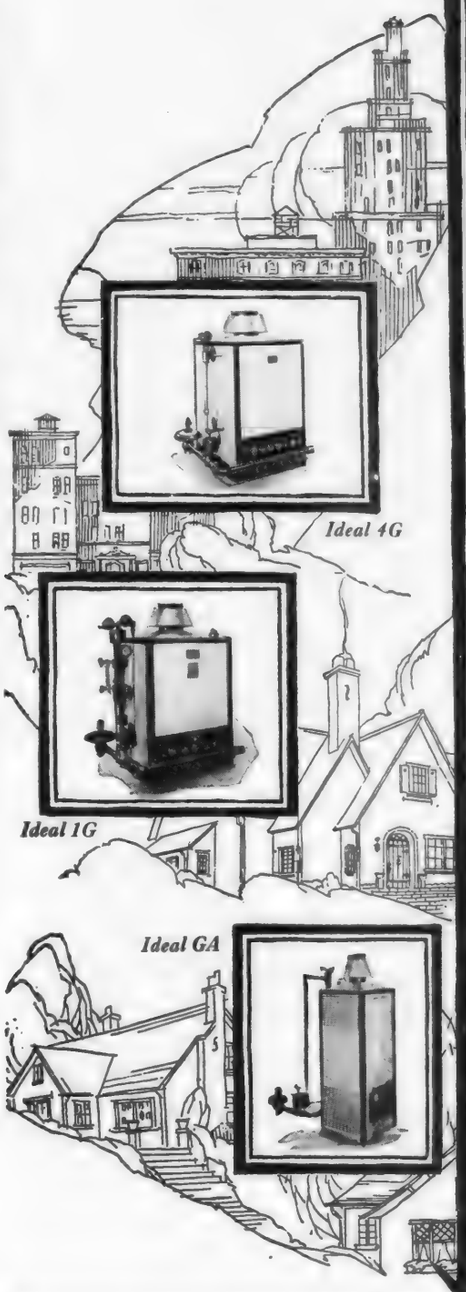
### *Far Superior to Joints Stuffed With Commercial Packing*

ENDORSED by architects, engineers and contractors, Sylphon Packless Expansion Joints are giving perfect satisfaction in many structures. They make for heating efficiency, save fuel and repair costs. Let us send you details of notable installations, and complete data, sizes, prices and shipping weights.

Your request for information implies no obligation on your part. Correspondence relative to any Sylphon Temperature or Pressure Control Specialty will be welcome. Write for Bulletin W J 100.

THE FULTON SYLPHON COMPANY
KNOXVILLE, TENNESSEE

*Representatives in all principal cities in U. S. A.*
European Representatives, Crosby Valve & Engr. Company, Ltd., 4½ Foley St., London, W 1, England.
Canadian Representatives, Darling Bros., Ltd., 140 Prince St., Montreal, Que., Canada.




On almost any heating job, one of these

# GAS BOILERS

*is cleaner, more convenient and more profitable*

## to you!

*For cottages or bungalows — with or without basements — an Ideal Arcola Gas Heater!*

*For small or medium-sized homes —Ideal 1G Gas Boiler!*

*For larger homes and buildings — Ideal 4G Gas Boiler!*

*For office buildings, big apartment houses, hotels — Ideal 4G Gas Boilers in multiple units*

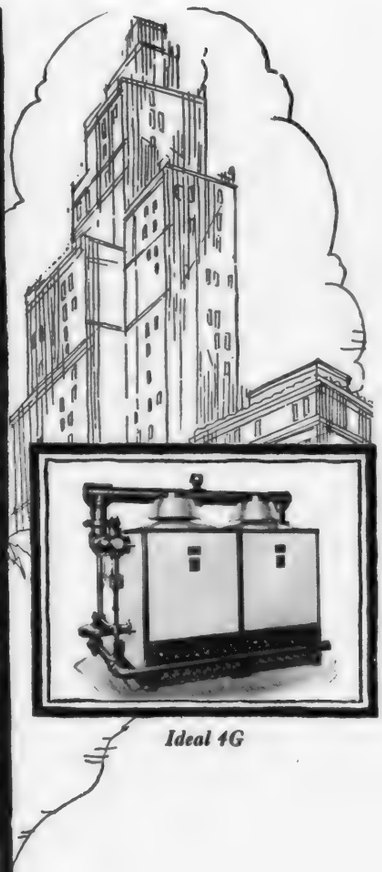
*All these boilers are useful for large-volume hot-water supply and industrial applications.*

LET your better customers know what it means to live in a house automatically heated by an Ideal Gas Boiler!

More and more gas companies are establishing special rates for heating, and cooperating with contractors. This means a clean net profit for you on every job. The gas company takes care of call-backs and service.

A complete range of boilers for every heating job—from a model cottage to the largest building.

*Write for details*




# IDEAL GAS BOILERS

*Product of* AMERICAN RADIATOR COMPANY *Gas Utilization Dept.*

*Write to* AMERICAN GAS PRODUCTS CORPORATION, *Distributors*

376 Lafayette Street, New York City

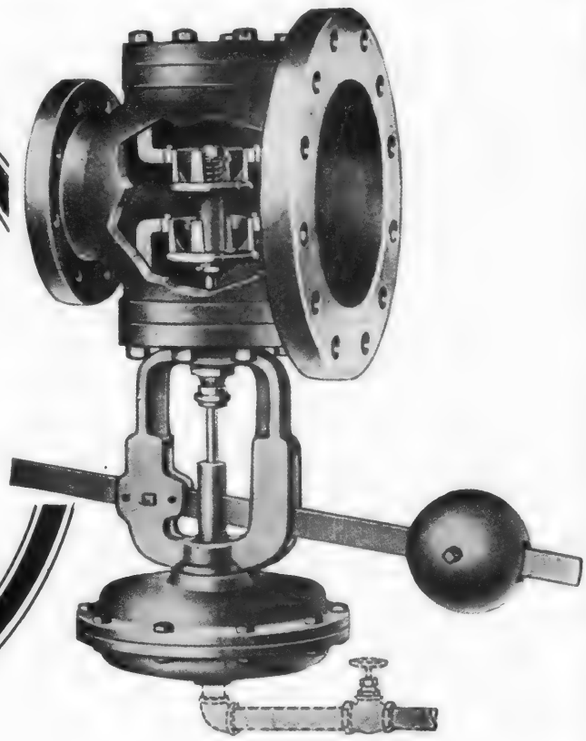
# McALEAR No. 155 Pressure Reducing Valves

FOR HEATING SERVICE—In connection with pressure or sub-atmospheric systems, there is no better valve than the McALEAR Figure 155.

These valves will maintain any reduced pressure above or below the atmosphere regardless of fluctuation in the initial pressure.

They are made in all straight sizes up to 20" and with expanded outlet in all sizes up to 12x24".

Initial working pressures up to 250 lbs.



**The name McALEAR is your Guarantee of Satisfactory Performance.**

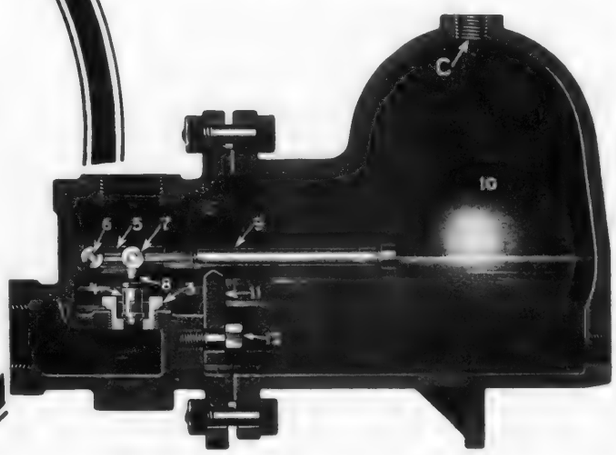
*Our 128-page Catalog No. 28 should be on every Engineer's and Heating Contractor's desk. It contains many handy charts, tables and symbols. Send for your copy today.*

# McALEAR No. 717 Ball Float Steam Traps

For Heating Service there is no steam trap which will do the job better than McALEAR No. 717 Ball Float Steam Trap.

Small, Rugged, Positive, Large Capacity —It meets every requirement for pressure or vacuum systems.

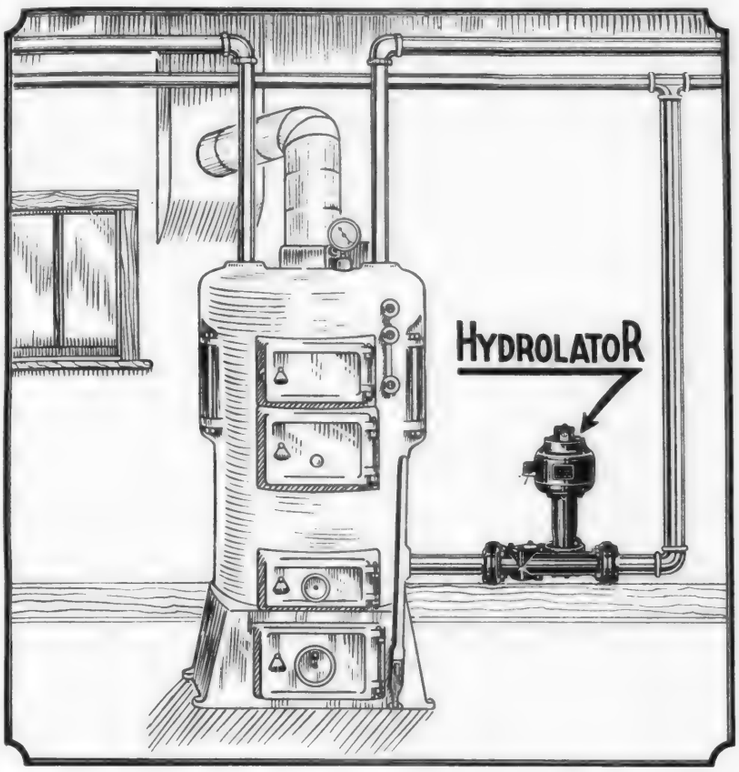
Our No. 725 and our No. 685 Traps are equally as efficient for high initial pressures up to 250 lbs. All Traps are guaranteed to pass water and air in large quantities and to close tight against steam.




***Agencies in nearly all principal cities. If there is no McALEAR Agent in your city, write us today.***

## THE McALEAR MFG. CO.

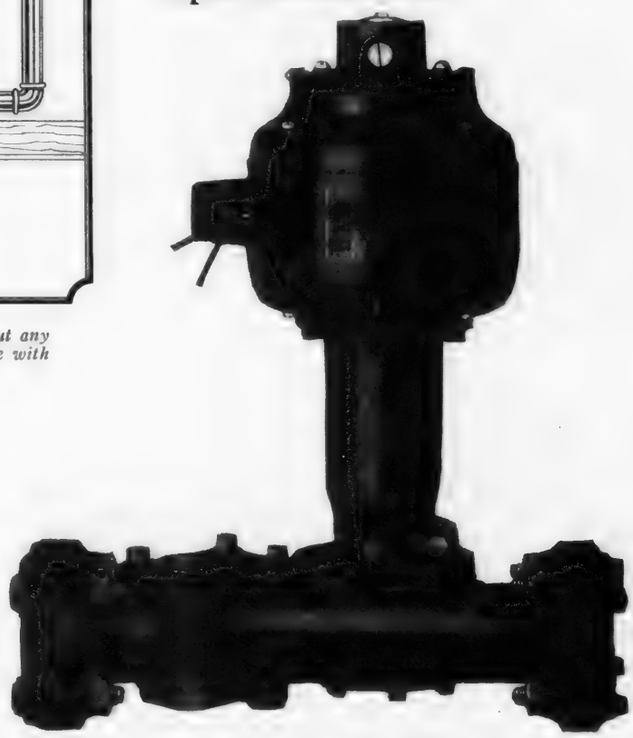
1901-7 South Western Avenue, Chicago, Ill.




*Typical* HYDROLATOR *installation showing how it can be used without any changes in standard practices. The* HYDROLATOR *does not interfere with normal flow of water when not in operation.*

# HOT WATER *Always*

**The HYDROLATOR on any hot water system insures a rapid circulation.**



## *Corrects all Hot Water Circulation Troubles*

Any hot water system will work more efficiently with a HYDROLATOR installed in the line. This device is a motor driven centrifugal pump which circulates the water mechanically and forces it to every radiator on the system. Wherever you have difficulty in securing rapid hot water circulation, the HYDROLATOR will correct this difficulty. Hundreds of installations have proved it.

**Saves Fuel**
**Eliminates Traps and Short Circuit**
**Forces Water to All Radiators**
**Insures Constant Supply of Hot Water**
**Increases Customers' Satisfaction**

**The HYDROLATOR**

Stimulates circulation by means of a motor driven pump. Intermittent operation, manual or automatic control. Requires little attention and always does the job. The HYDROLATOR is practically noiseless and improves circulation on any hot water system.

## *Free Engineering Help*

Our Engineering Department is ready to help you with any hot water heating problem you may have. Write us for free questionnaire blank on which you can explain the trouble you are having; or instead, explain this in your letter. Let us help you to solve it. There is no charge or obligation.

H V-12

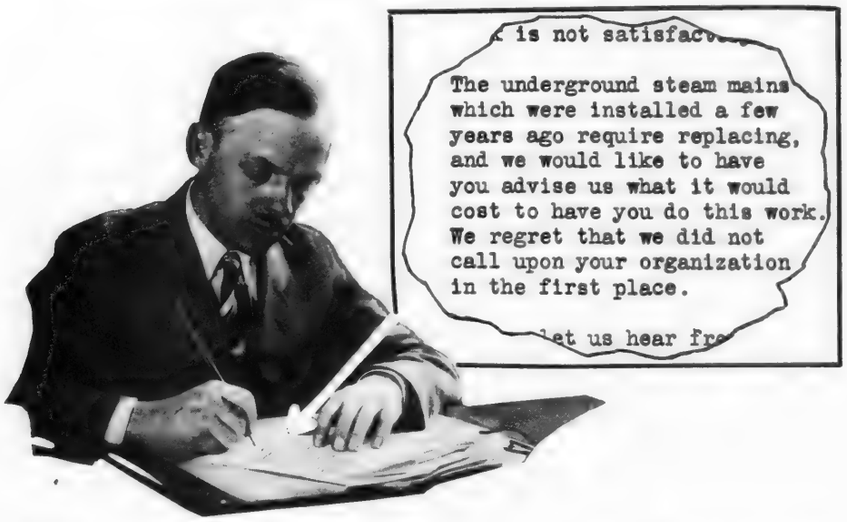
JANETTE MFG. CO. Dept. H-179, 556-58 West Monroe St., Chicago, Ill.
Please send me, without any obligation, full details of the HYDROLATOR, and tell me how I can make more money and have more satisfied customers by installing it.

Name .....
Address .....
City ..... State .....

**Janette Manufacturing Company**
**556-558 West Monroe Street**
**Chicago**

Singer Bldg.
149 Broadway
NEW YORK

Real Estate
Trust Bldg.
PHILADELPHIA


is not satisfac
The underground steam mains which were installed a few years ago require replacing, and we would like to have you advise us what it would cost to have you do this work. We regret that we did not call upon your organization in the first place.
let us hear fr

# Why do they write letters like *THIS?*

## *Because Inferior Equipment was used*

FREQUENTLY ADSCO receives letters asking the cost of equipment for repairs and replacement in underground steam lines that were installed but a few years ago and expressing regret that ADSCO Specialities were not installed in the first place.

Why do they write letters like this when the most casual investigation would convince them that ADSCO Red Diamond Brand Casing, Expansion Joints, Variators, Steam Traps, Reducing Valves, Gate Valves and other specialties for underground steam lines are especially designed to do the work required and at a minimum cost?

Through the installation of ADSCO Equipment and the recommendations of ADSCO Engineers, heating contractors and engineers are obtaining increasingly better results in the installation of underground steam mains that combine high efficiency with trouble-free operation.

When you build your steam lines with ADSCO Specialties, you have the assurance that comes with the knowledge that every ADSCO Product is the perfected result of over fifty years' experience in the design and installation of underground steam mains for power or heating purposes.

ADSCO Empire Steam Trap for low pressure. Capacity ranges from vacuum to 20 pounds pressure. Extremely simple and dependable, insuring continuous, carefree service at negligible maintenance.

ADSCO Nelson Gate Valve for 400 pounds working steam pressure. Completely mounted with non-corrosive metal. Designed for continuous, dependable service. Other valves for lower pressures.

ADSCO Model P Variator for pressures up to 125 pounds. Takes up expansion and contraction. Never requires packing nor any attention whatever.

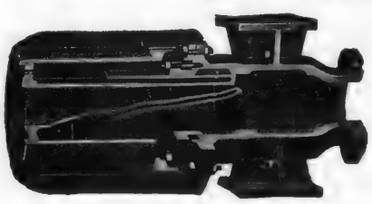
ADSCO Red Diamond Brand Casing for underground lines conveying saturated steam up to 50 pounds pressure. For higher pressures, ask for recommendations.

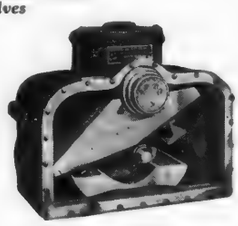
AMERICAN DISTRICT STEAM COMPANY
GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.

**ADSCO**

*Specialties for steam distribution*
*Expansion Joints—Meters—Casing—Gate Valves*
*Steam Traps—Reducing Valves*

ADSCO Duplex-Sleeve Guided Expansion Joint for pressures up to 500 lbs., temperatures up to 750° F. Air-cooled slip eliminates packing trouble, insuring years of faultless service.

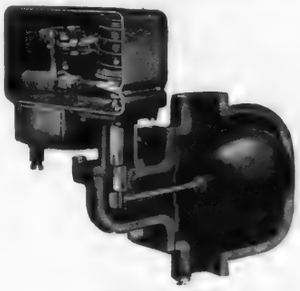




ADSCO Simplex and Rotary Condensation Meters for metering steam condensation. For departmental metering in manufacturing plants, and for District Heating Service.

# Boiler Protection

## Every oil-burner owner is entitled to the protection of this safety control



MERCOID
No. 612

SINCE the operation of oil burning equipment is almost entirely automatic, owners are not required to make frequent visits to the boiler room. And it is for this reason that some automatic means of checking the water level is necessary in order to guard against the firing of a dry boiler.

Recognizing the need for such protection, the National Fire Prevention Association recommends that an automatic control be part of the equipment on every steam or vapor oil-fired installation.

The Mercoid Low Water Cutout and Pressure Control No. 612 not only furnishes this indispensable protection against the firing of a dry boiler, but in addition provides a control to guard against the hazard of building up excessive steam pressure. The 612 is two instruments in one and thus makes it possible for the owner to have this necessary protection at a minimum cost.

The 612 employs the well-known Mercoid switch which carries the full line current from the motor at 110 or 220 volts. No transformers, relays or other intermediate mechanisms, subject to failure or requiring servicing. (Can, however, be furnished for three wire low voltage control.)

The design of the 612 provides that in case of damage to the float, bellows, power element or Mercoid switch, the current will be broken. Complete safety!

Its control range is adjustable from ½ to 9 pounds and can be set to accurately give control as close as ¾ of a pound or as wide as 5 pounds, if desired.

You can sell a 612 on every steam or vapor installation if you will simply point out that the cost of this double control is only a small fraction of what repair cost would be if the boiler is fired dry.

### *New Mercoid Control for High Pressure Work*

The latest addition to the already broad line of Mercoid controls for oil burning, is the No. 848 B-6. This instrument is designed especially for high pressures where extremely close control is desired. Its range is from 0 to 200 pounds and its adjustable differential is from 2 to 10 pounds. It is the only instrument on the market of its kind that will give close control at high pressure.

A broad line of Mercoid instruments is available for the control of temperature, pressure or vacuum; for Oil Burners, Unit Heaters, Blowers, Refrigeration and an almost unlimited variety of other industrial applications.

*Write today for detailed data and illustrated literature on the complete line of Mercoid Controls for Oil Burners.*

**AMERICAN RADIATOR COMPANY**
ACCESSORIES DIVISION, DEPT. M-712
40 West 40th Street New York, N. Y.

AMERICAN RADIATOR COMPANY
Accessories Division, Dept. M-712
40 West 40th Street, New York, N. Y.

Please send me free booklet containing blueprints of over 30 different Mercoid applications.

Name_____

Address_____

City_____ State_____

# Speed

*Laying Base Drain Foundation*

*Setting on Bottom Half Conduit*

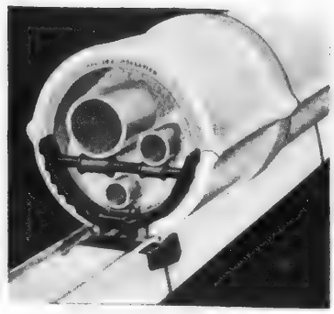
*Laying on Top Half Conduit*

## Only 3 Pieces to Handle in Each 2 Feet of Conduit

"The thing I like about Ric-wiL—and it's a big New York contractor talking—is the speedy way it goes in the ditch. Simple—fast—only three pieces to handle for each two feet of conduit. Take your base drain—set 'em in the trench like a row of dominoes. Bottom half conduit—set it on the base drain, slots are all ready for the bells. Top half conduit—lay it in place. When the pipes are in, stuff it with filler and cement the joints. .....Why it's only a fraction of the work required by conduits you have to build on the job."

Ric-wiL conduit goes in the trench with machine-like assembly. Its installation speed cuts your costs—there's no waste of either time or material.

These points, especially this year, account for the miles of Ric-wiL put in by some of the largest power and heating companies in the country. If you haven't the complete information on Ric-wiL—write today. Get all the facts.



*Showing how Ric-wiL Pipe Supports quickly dropped in place every 12 feet, wedge solidly in between sections of the base drain.*

*The Ric-wiL Loc-liP Joint is the only means of making a tile conduit watertight and of ample strength. Cementing is easy and quickly accomplished.*

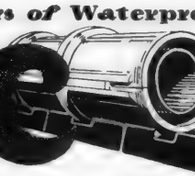
**The Ric-wiL Company**

**1567 Union Trust Bldg., Cleveland, Ohio**

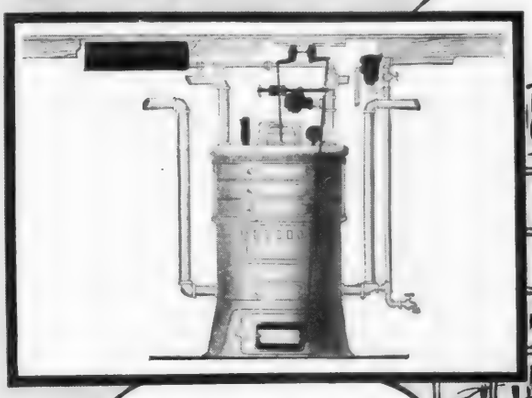
**Offices in Principal Cities**

**Originators *of* Waterproof Conduit Filler**

**Ric-wiL**



**UNDERGROUND CONDUIT**



# Satisfied! —and they tell others

## The best kind of advertising!

ONE of our dealers told us recently, "When I complete a Thrush installation, I know it is going to deliver 100 per cent Heating Efficiency---now---next year ---and many years in the future! It will continue to build good will for me! My customers are always satisfied and that is why I like to sell it."

Of course, there is another reason why dealers like to sell Thrush System and that is *profit*. The margin is generous, the sales plan is very effective, instalation is not expensive and Thrush Equipment gives any dealer the edge on competition.

*Often a well planned Thrush job costs less than an ordinary unregulated gravity system. It always makes any hot water heating job work better.*

Say goodbye to sluggish heat when you put Thrush System on the job. Thrush changes the job from gravity to a controlled pressure system with automatic damper regulation---that means increased heat transmission, greater fuel efficiency and more home comfort. Your customers will praise it highly and thank you for suggesting it.

One customer pleased means many more prospects. That is why thousands of dealers have found that Thrush System is truly a business builder. Now is the time to go after business. We have a complete series of posters, blotters, folders and dealer ads that will help you.

Coupon!

H. A. THRUSH & CO.
Peru, Ind.

Send me Illustrated catalog and price list---and tell me more about the profit-making Thrush System.

Name _____

Address _____

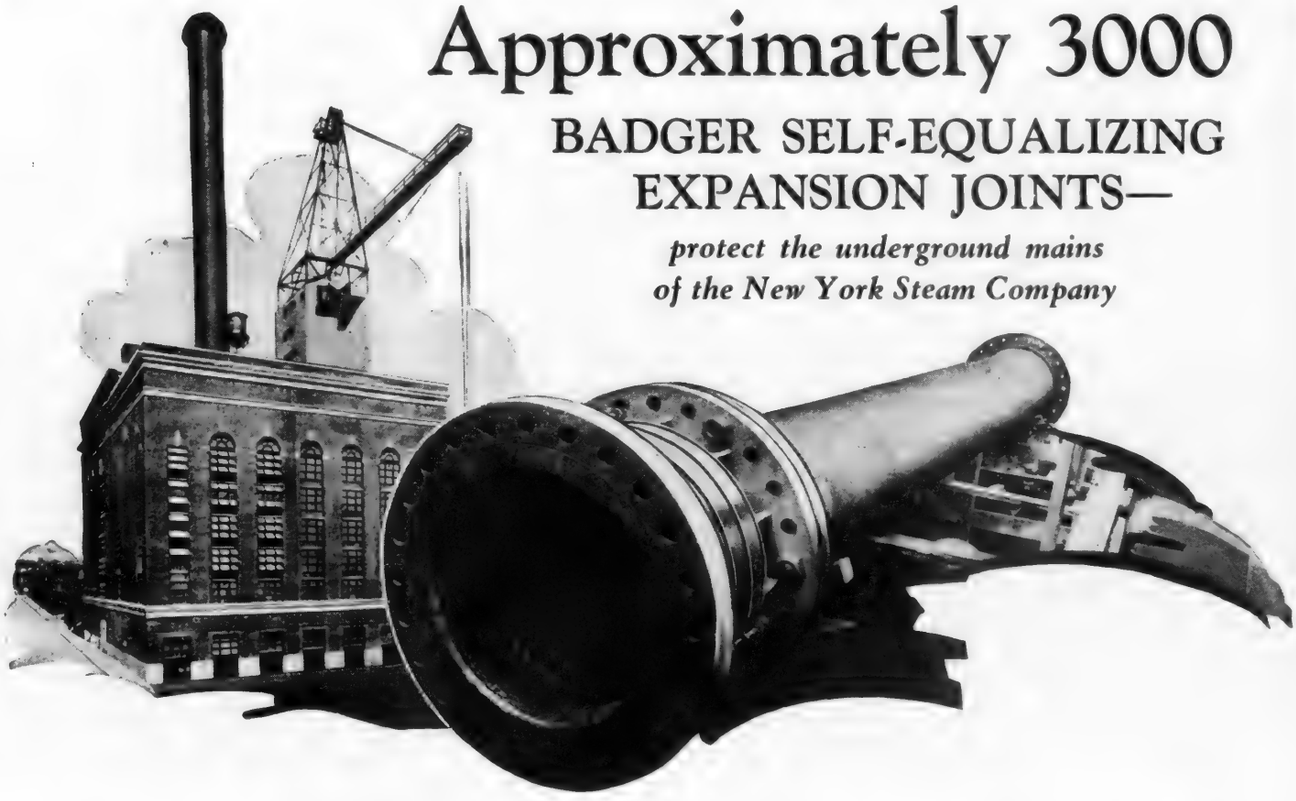
H A THRUSH & CO.
*Peru - Indiana*

# THRUSH SYSTEM
## OF HOT WATER HEATING

# Approximately 3000

## BADGER SELF-EQUALIZING EXPANSION JOINTS—

***protect the underground mains of the New York Steam Company***



About 15 years ago a few Badger Self-Equalizing Expansion Joints were first installed in the underground mains of the New York Steam Company. Today the number in service under New York City's streets has grown to a total of approximately 3000 as a result of the leakless and uninterrupted service given without maintenance expense.

Badger Self-Equalizing Expansion Joints are unexcelled in flexibility and long life. When installed with proper anchorage and guides the joints will continue in service for years without attention. The deeply corrugated one-piece copper tube element is protected from distortion and wear by external equalizing rings, located between the corrugations. These distribute the movement of the pipe line uniformly among all the corrugations.

Guaranteed to 200 lb. working steam pressure. Furnished with either standard or extra-heavy flanged ends, or with wrought iron or steel nipples that may be welded directly into the pipe line. Also furnished in double-units with self-contained anchorage and guides and with or without service outlets.

***Write us for illustrated Bulletin.***

**BADGER ENGINEERING SERVICE**

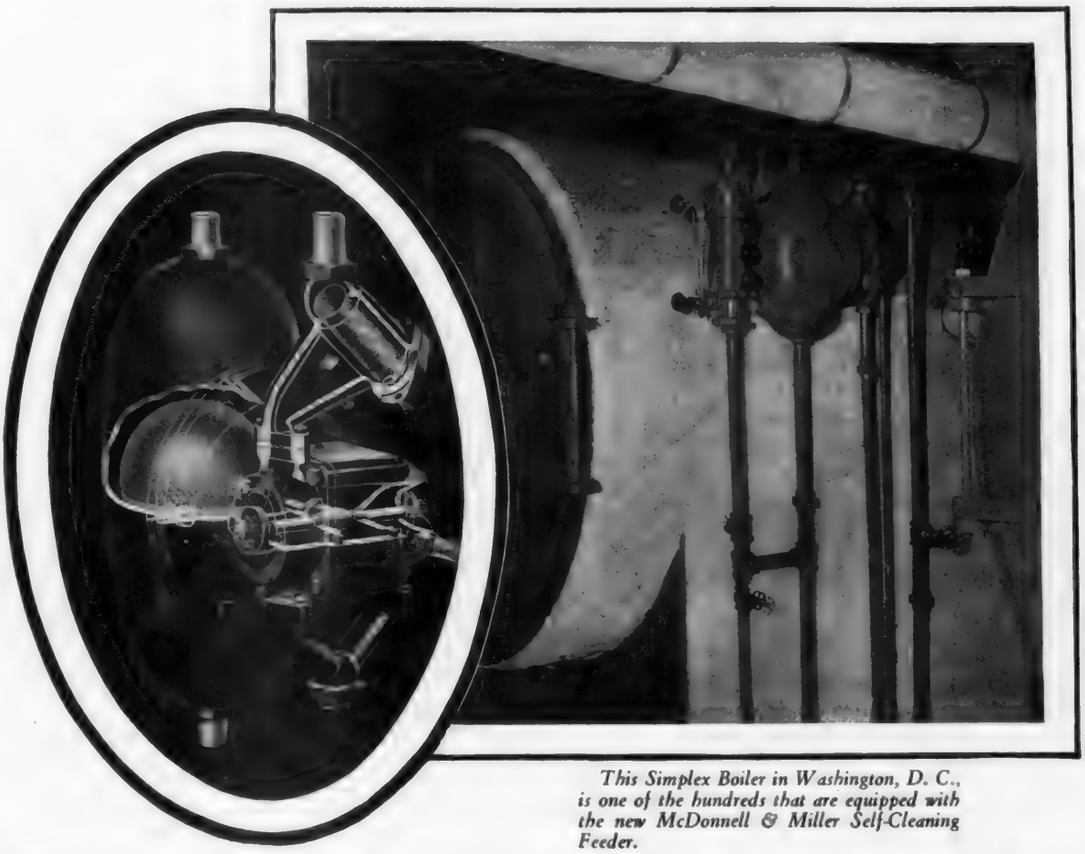
**Badger engineers are designers, manufacturers and installation experts for the following and kindred power plant products: Pipe Bends, Chemical Apparatus, Copper and Sheet Metal Work, Copper Boilers.**

## E. B. BADGER & SONS CO., 75 Pitts Street, Boston, Mass.

**New York: 271 Madison Ave.** ***Representatives in all principal cities*** **Chicago: 2831 South Parkway**

**BADGER EXPANSION JOINTS**

ESTABLISHED 1841 · WEATHER VANE ON FANEUIL HALL · E. B. BADGER & SONS COMPANY · TRADE MARK



*This Simplex Boiler in Washington, D. C., is one of the hundreds that are equipped with the new McDonnell & Miller Self-Cleaning Feeder.*

# To forget is human—to protect: *good business*

If it wasn't human to forget, there would be no need for safety valves, block signals and trial balances. But, strangely enough, there are literally thousands of heating boilers that are covered with every kind of safety appliance except the device that offers the most vital protection of all—*the device that keeps the boiler water line where it belongs!*

Go back over the pages of your experience with heating boilers. What has caused more trouble than the boilers that were flooded when someone forgot to turn the feed water *off*? And what has caused more expense than the boiler that cracked or burned out when someone forgot to turn the feed water *on*?

It's an item too important to overlook for another heating season, isn't it? Yes, and it's a function too vital to entrust to any boiler feeder but the *best*.

The new self-cleaning McDonnell & Miller Boiler Feeder is the answer of experience to the growing demand for a feeder that will work right under all conditions —always—anywhere. Its rotary, self-grinding valves are the first to offer uninterrupted service where feed water is hard or rank. Its big capacity makes it equal to any emergency such as failure of current to the condensation pump. Its adjustable water level is the greatest step ever taken in simplifying installation and cutting installation cost. Its unprecedented mechanical refinement is totally out of keeping with its cost which is naturally higher, but very little higher, than that of just an ordinary feeder.

Where shall we mail your copy of the interesting book which contains capacity curves and other data? Tell us on the coupon.

**McDONNELL & MILLER, 710 Wrigley Building, Chicago**

**McDONNELL & MILLER**

*SELF-CLEANING*

**Duplex Feeder**

*"Doing one thing well"*

Yes, I want the facts about the self-cleaning feeder.

Company_____

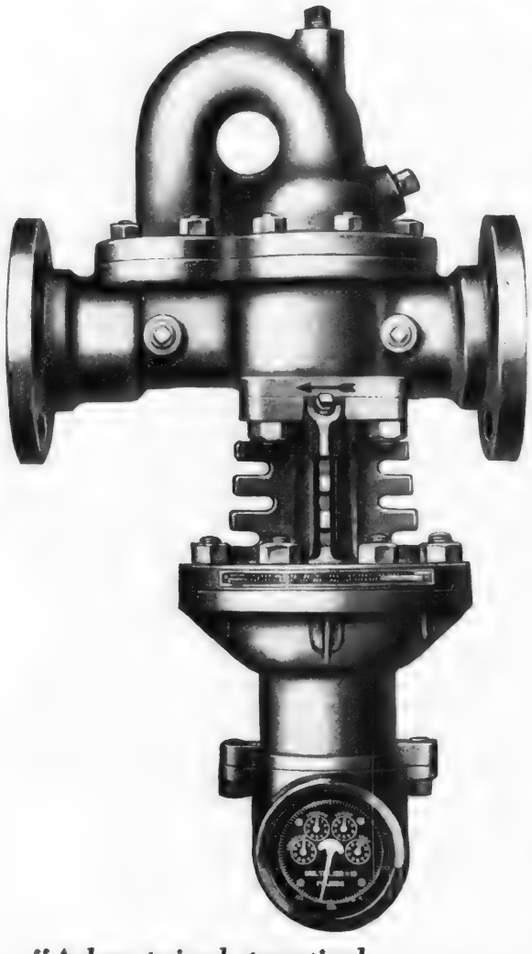
Name_____ Street & Number_____

City & State_____

Mail to M-Donnell & Miller, 710 Wrigley Bldg., Chicago

(H&V-12)

# Anaconda Checks Extravagant Use of Steam



*"A low priced, practical steam meter for small lines"*

With permission, the following is quoted from a report of the Superintendent of the Anaconda Power Plant of the Anaconda Copper Mining Co.

> "In regard to the use we are making of both the steam and air meters which we purchased from the Builders Iron Foundry, these meters are used to measure the amounts of steam and air delivered to each department and used each month.
>
> The purposes for which this information is gathered are first — to correctly charge the departments for the amounts used—to stop extravagant or excessive use of these expensive items by finding the actual cost, and also to quickly locate leaks in our piping systems."

This company is one of many which have chosen Shunt Meters as the *economical* meters with which to check steam and air distribution.

Bulletin 234, data sheet, and prices will be mailed upon request.

## New York Power Show—Booth 28

## BUILDERS IRON FOUNDRY

***"Builders of the Venturi since 1891"***

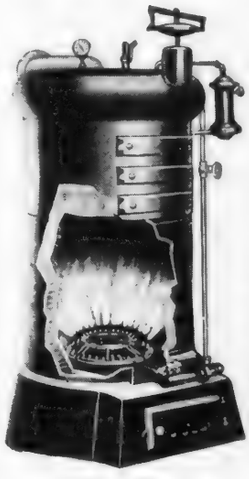
**11 Codding Street** **Providence, R. I.**

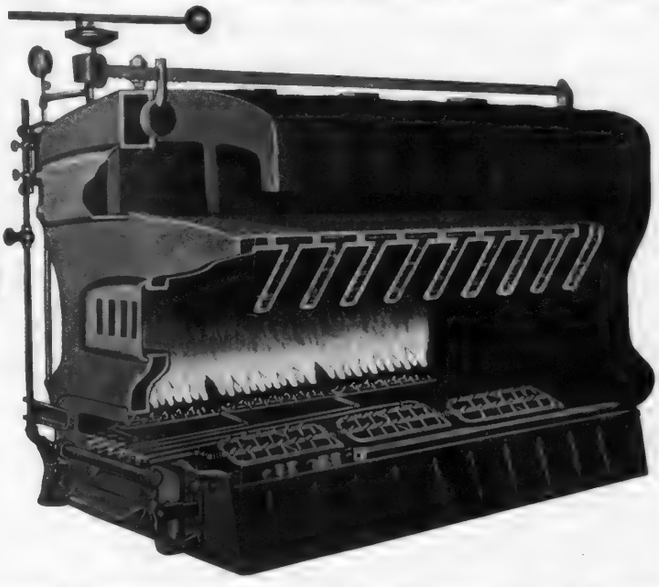
# BARBER PATENTED JET GAS BURNERS

## *Are Unexcelled for Conversion Work*

The principle of combustion utilized in Barber Burners is an outstanding and exclusive feature that makes Barber Burners unsurpassed for efficiency, economy, and dependability.

A great variety of designs, sizes, and capacities render them exceedingly flexible in their application to the exact requirements of any type of heating device.





Converting coal-burning furnaces and boilers into modern gas heaters offers big profits to alert men in the heating industry. Go after this business right now. Our years of missionary work have blazed the trail for you. Order a stock of Barber Burners to-day, and get our effective circulars, broadsides, window display signs, newspaper ad mats, etc. These sales helps make it easy for you to sell the most skeptical prospective customer.

## *You Can Do it Better With Barber Burners*

**The CLEVELAND GAS BURNER & APPLIANCE CO.**
*Burner Specialists*
3702-04 Superior Avenue, Cleveland, Ohio

only

# $385

The new Hardinge Junior is now selling for only $385 completely installed (tank extra). This sensationally low-priced model, maintaining every tradition that has made Hardinge the leader in its field for the last 12 years, makes the Hardinge franchise a doubly valuable possession. It places every Hardinge dealer in the position to offer small home and apartment owners the highest standards of oil heating efficiency at a price as low and *even lower,* in some cases, than asked for ordinary burners.

¶ Built in 12 different sizes and combinations, both domestic and industrial, the Hardinge line offers a specific model for every heating need from bungalow to skyscraper.

A brief note or postal card request brings you full information about the ever growing value of the Hardinge franchise. Write *today.*

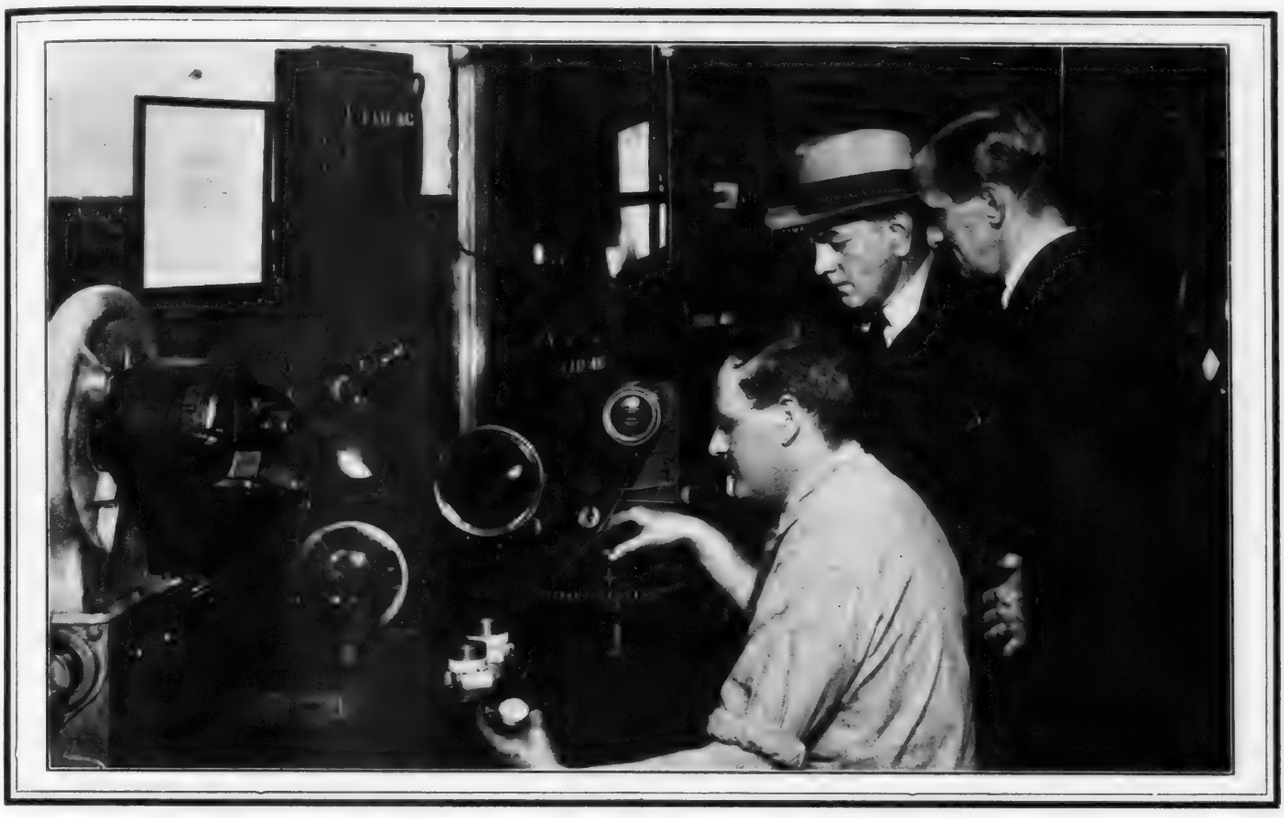
# HARDINGE
# FUEL OIL HEAT

## Hardinge Brothers, Inc.

*Factory and General Offices*

4149 Ravenswood Ave. Chicago, Ill.

Factory Branches: CHICAGO–MICHIGAN AVE. at OHIO BOSTON–843 BEACON ST.



*W. C. McTarnahan, President, and James N. Macrae, Chief Engineer, of the Petroleum Heat and Power Co., check the work of an operator verifying the R.P.M. of a Petro atomizing cup.*

# By making *air* do the work *they simplified oil heating*

PETRO engineers have reduced oil heating to very simple elements. They have made air do the work of expensive gears, belts and shafts. Not only does air do it better, more quietly, more efficiently, but air costs nothing and never wears out. In this way they have made Petro Oil Heat so certain that Petro dealers everywhere guarantee absolute satisfaction.

With such dependability, service cuts no slice out of profits. Petro dealers are prospering under the Petro plan. Where territory is still available, a real opportunity awaits the organization big enough to represent the complete Petro line of engineered oil burners.

PETRO

REG. U.S. PAT. OFF.

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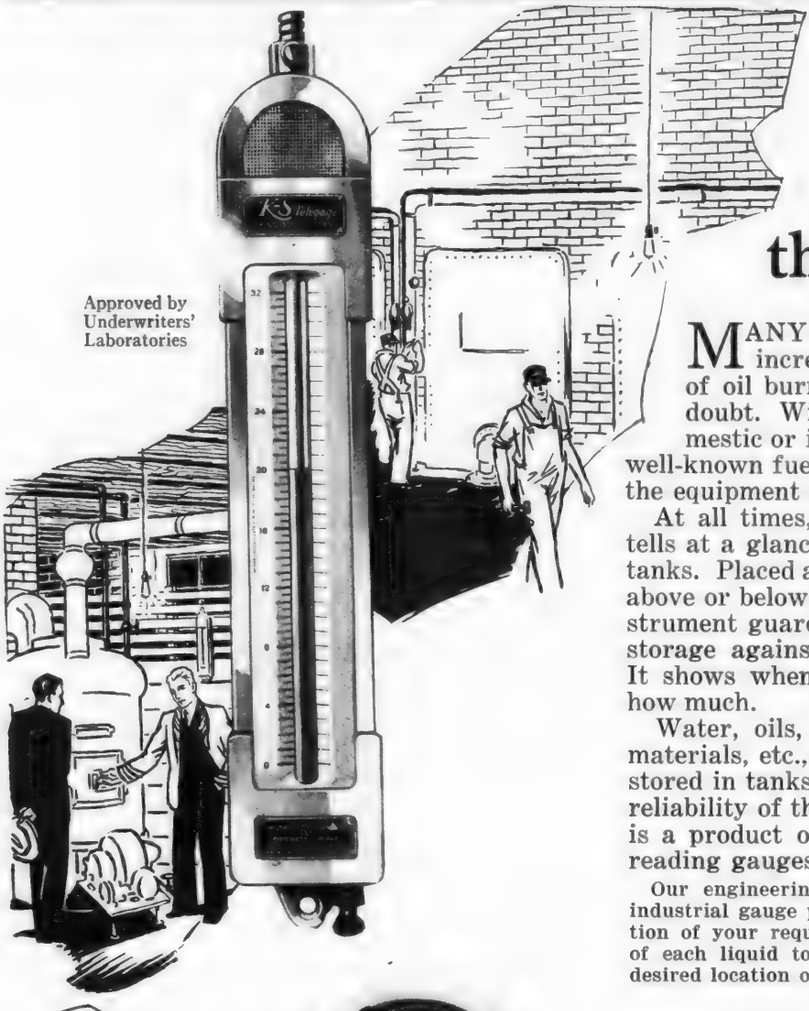
**Domestic and Industrial Oil Burners**

**Petroleum Heat & Power Company, Stamford, Conn.**

***Makers of Oil Burners since 1903***

**Fess System Company, (subsidiary) San Francisco, Cal.**

THE HYDROSTATIC DISTANT READING GAUGE




Approved by Underwriters' Laboratories

# An Oil Burner Idea that You Can Sell

MANY heating engineers and contractors are increasing their profits by selling the idea of oil burner equipment which leaves nothing in doubt. With every new oil burner, for either domestic or industrial installation, you can offer this well-known fuel oil gauge as the final touch that makes the equipment fool-proof.

At all times, with ease and accuracy, the Telegage tells at a glance the actual depth of liquids in storage tanks. Placed at any distance from the tank, and either above or below it as you may prefer, this precision instrument guards fuel oil and all other kinds of liquid storage against checking errors and costly failures. It shows when a new supply is needed, and exactly how much.

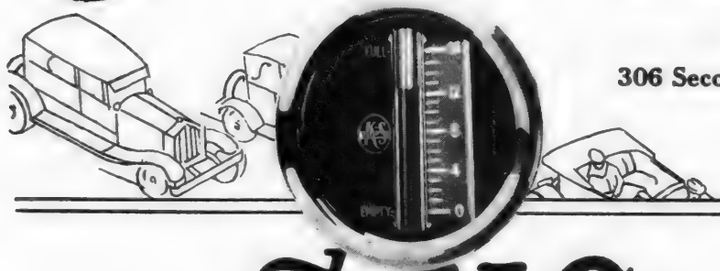
Water, oils, chemicals, gasoline, fuel oil, finishing materials, etc., are a few of the many industrial fluids stored in tanks and guarded by the K-S Telegage. The reliability of the Telegage is assured by the fact that it is a product of the world's largest maker of distant reading gauges.

Our engineering department will be pleased to discuss any industrial gauge problem, if you will write giving a full description of your requirements. Give the Baume or Specific Gravity of each liquid to be measured, and the distance from tank to desired location of gauge. Descriptive folder sent on request.

**KING-SEELEY CORPORATION**

**306 Second Street** **Ann Arbor, Michigan**

*Branch Offices:*
*New York—44 Murray Street*
*Chicago—472 Wrigley Building*



# The K-S Telegage

BE CERTAIN WITH THE *K—S TELEGAGE*

*Standard factory equipment on three-fourths of all cars selling for $700 or more.*

# IN PLANNING *for* 1929

## Be Guided by the Success of Nokol Dealers During the Current Year

Good news spreads quickly! During the last half of 1928, Nokol made some very important announcements to the industry at large. News which quickly made the Nokol franchise even more valuable than ever before . . . greater sales opportunity for established dealers . . . a rare opportunity for prospective dealers!

Noiseless Nokol gives the dealer the advantage of a product . . . backed by the oldest and soundest manufacturer in the industry . . . with a merchandising policy which protects your sales and profits . . . and a complete line including every accepted model of automatic oil burning equipment. All facts of significant value in making your plans!

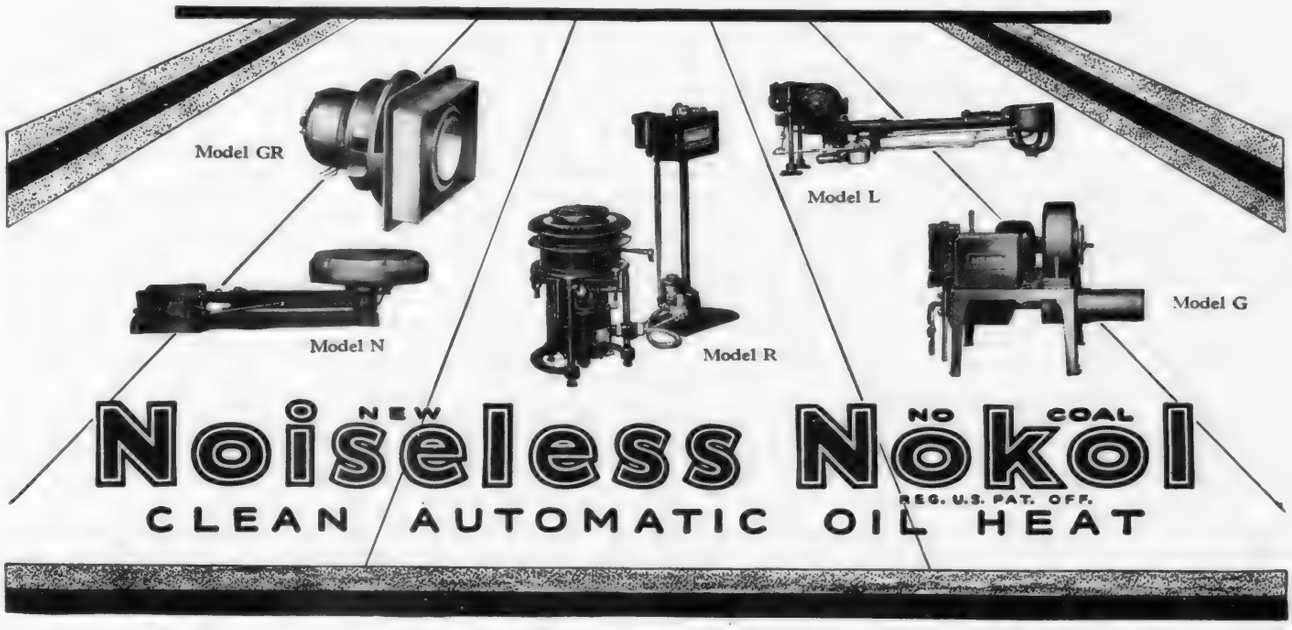
In setting your program for 1929, let us help you. Let us show you what a tremendous market is opened for the dealer who has . . . a model for every requirement . . . a size for every job . . . a price for every purse . . . Noiseless Nokol! Full facts gladly submitted upon request!

### All Accepted Models

**Your salesmen have a real selling advantage in being able to say "Our recommendations are made in exact accordance with the requirements of your heating plant—for we alone in this community have every accepted model of equipment for the automatic heating of homes with oil."**

AMERICAN NOKOL CORPORATION

**4231 Schubert Ave., Chicago, Ill.**




NEW Noiseless NO COAL Nokol

REG. U.S. PAT. OFF.

CLEAN AUTOMATIC OIL HEAT

# A Good Oil Burner NEEDS Webster Ignition

THE OLD ADAGE, "A chain is as strong as its weakest link", applies to oil burners and their ignition units . . . An oil burner that refuses to burn because of faulty ignition is "No good", in the opinion of the buyer . . . . Insure the good name of your product by adopting the Webster Ignition Transformer . . . The acknowledged leaders in the industry depend upon it for reliable service in all communities . . . The advantages of the five Webster features will be thoroughly explained by the Webster Engineering Laboratories . . . . Twenty years of electrical experience enables us to discuss ignition problems with authoritative knowledge . . . Professional advice is given gratis.

WEBSTER ELECTRIC COMPANY, Racine, Wisconsin

*"Specialists in Oil Burner Ignition"*

*The Webster Ignition Transformer can be furnished with either single or double high tension terminals, for a variety of voltages and frequencies.*

Webster Ignition Transformer

***Know Electrol by the Homes It Heats***

The beautiful Bedford, Massachusetts, home of Mr. Arthur H. Hayden. Heated by Electrol.

# *The* COST *of oil heat* IS LOW *with* ELECTROL!

Not expensive, as some may think . . . Electrol automatic oil heat costs less than coal in many instances; often practically the same; in a few cases, more. But even when the cost is higher, the home owner still considers the expense low and entirely commensurate with the greater comfort and many advantages provided by this finer oil burner. ' ' Electrol principles and design produce the highest efficiency of any automatic heating unit operating in a coal-burning boiler. Electrol produces more heat from every dollar's worth of oil. Operates intermittently instead of continuously, burning fuel only as heat is needed.

***A good burner to recommend***

Quiet . . . All Electric . . . Entirely Automatic, Electrol is the oil burner with the exclusive *Master Control*, which stands watch like a living sentinel at the furnace door safeguarding comfort day and night. ' ' Electrol is built right to begin with. It is shipped to the dealer completely assembled just as it passes its final rigid factory test and inspection. And it is installed by men who have been thoroughly trained by the factory in the correct methods of fitting the burner to every type of heating plant.

You will find Electrol dealers candid and conscientious in their statements covering the possibilities of Electrol for each job. The Electrol dealer will recommend the installation of the burner only after he has determined that it will operate with complete satisfaction in the existing heating system.

***A New Source of Income for You***

Without any investment on your part you can make money from the sale of the Electrol oil burner. Working arrangements can be effected with the Electrol Sales and Service Representative in your locality whereby you can co-operate with him to your mutual benefit and advantage.

Send for literature on this finer oil burner and let us put you in touch with our nearest dealer. No obligation involved, of course—and a talk with him will show you how you can profit by working together and open up a new source of income for you.

Electrol, Incorporated
177 Dorcas St., St. Louis, U. S. A.

*Electrol automatic oil heat is providing a satisfying and lasting adventure in greater comfort and convenience in thousands of homes.*

**A Size for Every Job**

*Electrol is made in three sizes, models TJ, T and TD with ranges respectively from 200 to 800, from 600 to 3,000, and from 2,000 to 8,000 square feet of steam radiation including piping and risers or equivalent.*

**An Opportunity for Profit**

*Without any investment whatever, you can make money selling Electrols. Let us or the Electrol dealer in your city give you full particulars.*

# ELECTROL

## *The* OIL BURNER with *The Master Control*

*Listed as Standard by the Underwriters' Laboratories, and bears their label.*

Member of the Oil Heating Institute

Electrol, Incorporated
177 Dorcas St., St. Louis

Gentlemen: Please send complete details of Electrol Oil Burner . . . . . Who is your nearest dealer . . . . .

Name . . . . . .

Address . . . . . .

City . . . . . State . . . . . .

# Pleasure and Profits in Selling Toridheet Installations

THE most skeptical prospect opens his eyes when he sees the Toridheet Demonstration. This burner has no hum or hiss or whine. It has surprisingly clean combustion. It is completely automatic. It is more than safe—it is supersafe. Economical? Certainly!

It must be that these qualities are responsible for the universal satisfaction created by Toridheet installations. Thousands of owners say it's the best they've ever seen.

This remarkable burner has simplicity of design and the most careful workmanship. Therefore it runs with all the smoothness and dependability of a crack railroad train.

*Equipment is easily installed. Free from profit-stealing, time-wasting service calls. Listed as standard by the Underwriters' Laboratories. Approved by New York Board of Standards and Appeals and by Massachusetts Board of Public Safety.*

This is why it's a pleasure for any dealer to sell a Toridheet Installation.

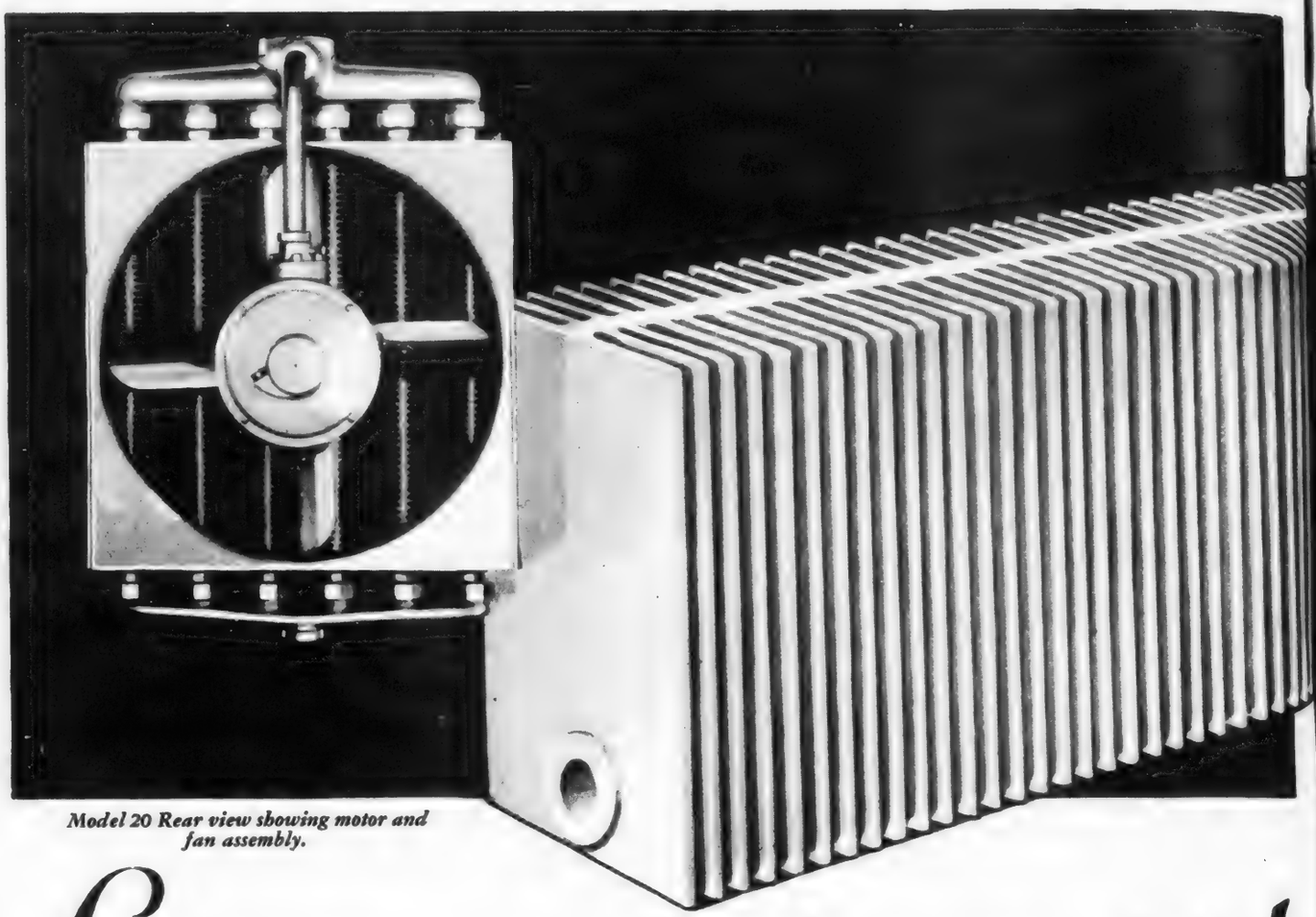
Price? That, too, stands comparison with anything in the field. It is reasonable.

Profits? Yes, indeed. Enough so that once a dealer has a Toridheet Franchise he guards it zealously. Our plan for dealers is full of interest to any progressive dealer. Exclusive territory is in great demand. Write today for the Toridheet Profit Story.

TORIDHEET
OIL BURNER
FOR BETTER HOME HEATING

CLEVELAND STEEL PRODUCTS CORPORATION
MADISON AT WEST 74th STREET CLEVELAND, OHIO

TAKE THE AIR FROM THE UPPER STRATA
ERIE
UNIT HEATERS
HEAT IT, COOL IT, OR CONDITION IT
AND PLACE IT JUST WHERE YOU NEED IT
ERIE
HEATING SYSTEMS



*Model 20 Rear view showing motor and fan assembly.*

# *Let's get at the heart of it!*

COMFORTABLE, uniform temperature. Every corner in the room, every area about the draughty windows or out in the center of the room registering the same degree of warmth . . . a degree of warmth that can be controlled at all times. Then the time cards register production and not merely hours. No cold feet—no overheated workers. Healthy and comfortable, they give 60 minutes of 100% production every working hour.

This uniformity is most economically and efficiently maintained by those Unit Heaters that circulate the air drawn from the warm upper air strata through a core containing steam or hot water. The fan forces this heated air with velocity sufficient to reach and break up the cold air strata upon the floor. This warm air volplanes through and mixes with the cold air, the air stream rises as its velocity dwindles, circulating the evenly warmed air to every inch of the room. But a Unit Heater is only as good as its heating unit.

The heating section of the Erie Units is an integral casting of Aluminum. The steam channel and extended surfaces are cast in one piece; no joints, no welding, no flanges, no brazed or soldered sections. Freezing cannot impair it. Galvanic action cannot weaken it. Dropping it or even throwing it upon a cement floor cannot crack or fracture it. It just cannot leak!

Although light in weight, it will withstand an operating pressure of 250 pounds and its heat dissemination equals 2 tons of radiator or steam coils.

The secret of its heat dissemination is in the streamline design of the core and extended surfaces which permits of a natural, quick movement of air through the heating element. More air, handled at higher velocity, projected farther . . . that means more comfort and greater fuel economy.

Erie Unit Heaters can be used without change in hot water, steam or vapor systems, as well as with cold water, brine or refrigerant in cooling systems. It is the last word in Unit Heating, the newest in design, incorporating every known advantage in industrial heating.

# ERIE UNIT HEATERS
## ERIE HEATING SYSTEMS

**ERIE, PA.** INCORPORATED **U. S. A.**

**MONTGOMERY BROTHERS - SAN FRANCISCO - LOS ANGELES - SEATTLE**

*Pacific Coast Distributors*

*del 20 Erie Unit Heater. view showing all ires set for horizontal air stream.*

*Every assistance to the free passage of the air stream through the panels between the fins is provided by means of the stream-line construction of the steam core, parallel spacing of the fins, and rounded edges.*

ERIE

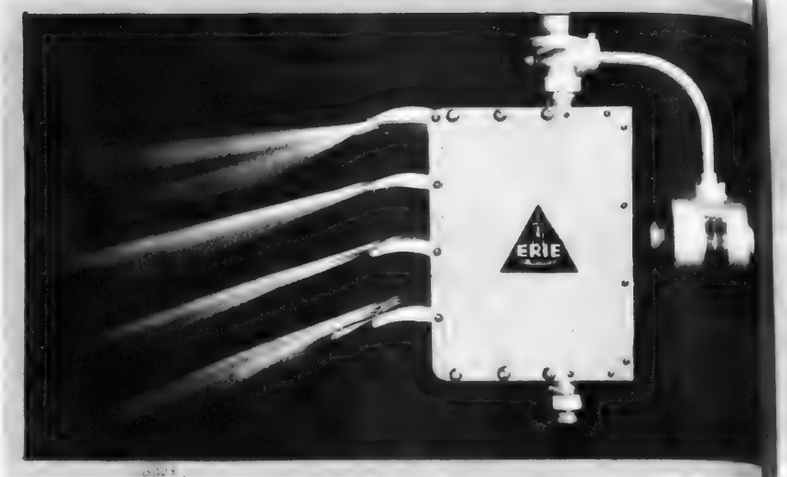
UNIT HEATERS

ERIE HEATING SYSTEMS
ERIE, PA. U. S. A.

*Now turn over to the next page*

# ERIE UNIT HEATERS AND ASSEMBLIES

*may be applied to every problem of space Heating or Cooling, Process Drying, Dehydrating or Air Conditioning*




Louvres adjusted for horizontal delivery of air stream.

Louvres adjusted to divide air stream.

**For Ventilation**

Erie Units will bring in the outside air, temper it, and distribute it.

**For Process Drying**

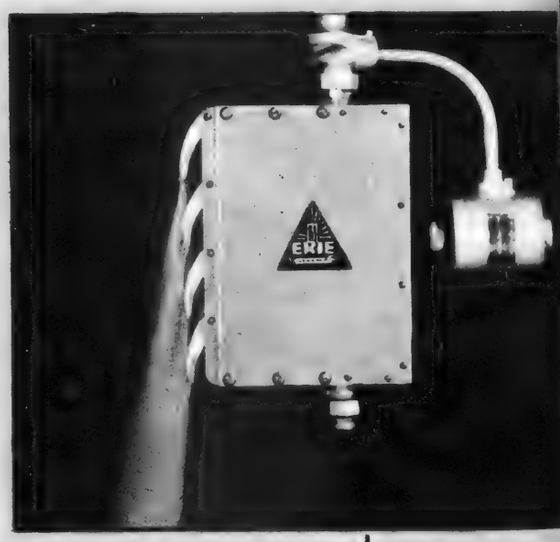
Erie Units will save you time, space and labor in removing moisture.

**For Cooling or Refrigeration**

Erie Units solve the problem by direct connection to the refrigerant pipe lines, directing the flow of air as desired.

**For Air Conditioning**

Correcting drafts over chilled or damp floors, the removal of gases or fumes, the dissemination of steam or fog, Erie Units provide the final correct and economical solution.




Louvres adjusted for vertical delivery of air stream.

## Erie Units for Concealed or Cabinet Heating

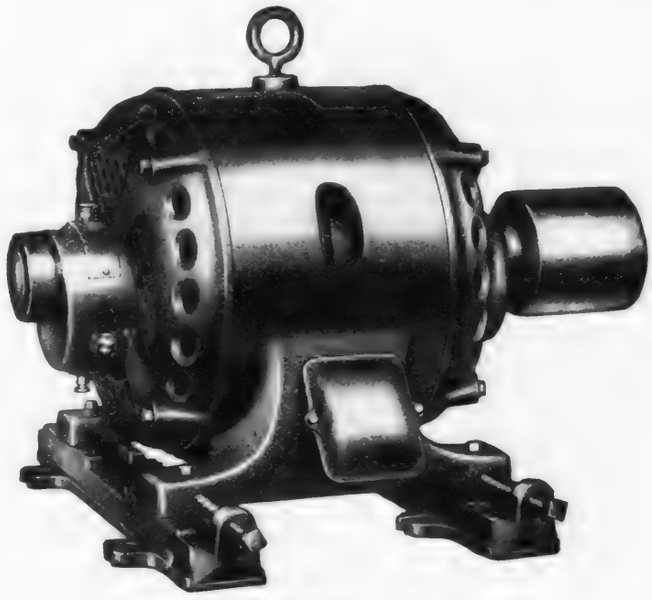
The warming of large or small offices, assembly and sales rooms or dining rooms, where steam radiators are both insufficient and censored, is accomplished with Erie Units concealed in the walls. The leak-proof and troubleproof Erie heating element is essential and ideal for this type of heating.

## Get the Rest of the Story

A line on your letterhead will bring the complete story of Erie Units and their application to all forms of Industrial and Commercial, Institutional and Residential Heating, Cooling and Air Conditioning. And the co-operation of our Engineering Staff is at your service. IT'S FREE!

**ERIE HEATING SYSTEMS**
INCORPORATED
ERIE, PA., U. S. A.

ERIE
UNIT HEATERS
ERIE HEATING SYSTEMS ERIE, PA. U. S. A.



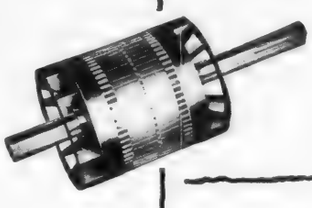
7½ Horse Power Century Type SC Squirrel Cage Induction 3 and 2 Phase Motor

# There is a Difference!

YOU cannot judge a motor by looking *at* it. You must look *into* every part of it . . . If you investigate Century Type SC Squirrel Cage Induction 3 and 2 Phase Motors, you will find a well-balanced design, durable, substantial and accurate construction, proper allocation of all active materials and many other points of decided difference that make them highly desirable wherever continuous service is essential.

Century Type SC Squirrel Cage Induction 3 and 2 Phase Motors are built in standard sizes from ¼ to 200 horse power.

*The armatures of Century Type SC Squirrel Cage Induction 3 and 2 Phase Motors are practically indestructible. They possess the most desirable electrical characteristics.*



CENTURY ELECTRIC COMPANY

1806 Pine St. St. Louis, Mo.

*35 Stock Points in the United States and more than 50 outside thereof*

Century MOTORS

"THEY KEEP A-RUNNING"

# It Stands to Reason

## . . . that the Greater Efficiency of . . . . . FLAX-LI-NUM Means an Increased "Comfort Factor" . . . . . for the Home

IT is the sole function of insulation to *efficiently* and *economically* check the unnecessary waste from "heat leakage" through walls and roof . . . *To sustain in the greatest possible degree the warmth supplied by the heating plant.* There is no other justification for its use.

Consequently, the position of FLAX-LI-NUM for insulation purposes is clearly established. It stands to reason that when, by the remarkable "two-air-space" principle of application, FLAX-LI-NUM increases its own insulating value fully 50%, it, at the same time, increases the "comfort factor" of the home proportionately.

FLAX-LI-NUM is installed between the studs to form "two-air-spaces" in the wall. According to the U. S. Bureau of Standards tests, one-half inch material applied in this manner is equal to three-quarter inch material used as a plaster base or in contact with the sheathing.

These are facts . . . *undisputable* . . . And because FLAX-LI-NUM takes advantage of them, it has made possible this new and higher standard of efficiency. Let us send you the full story of our accepted recommendations — one inch for the roof and one-half inch for the side walls.

FLAX-LI-NUM INSULATING COMPANY,
St. Paul, Minnesota HV 12

Send me complete information about Flax-li-num. Also facts about the two-air-space principle of application.

Name.....

Address.....

City.....

State.....

FLAX-LI-NUM INSULATING COMPANY
ST. PAUL, MINNESOTA

**Flax-li-num**

A CORRECT BUILDING INSULATION AND SOUND CONTROL MATERIAL

# Fine hotels *must* have the finest of heating equipment

*St. Francis Hotel, San Francisco,—comfortably, economically heated with oil, and uses Johnson oil burning equipment in its kitchen. Where comfort and efficiency are paramount you find Johnson installations.*

NO OTHER factor is so important to comfort as proper heating. Great hotels, specializing in "comfort," *must* select heating equipment wisely.

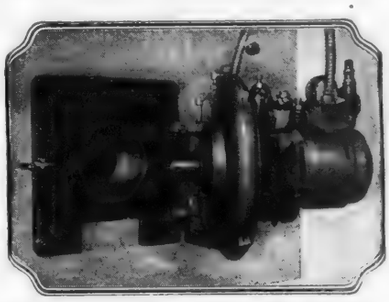
San Francisco's famed hotel, The St. Francis, solved its heating problem with the selection of Johnson Oil Burners.

And this preference for Johnson oil burning equipment extends from coast to coast. In small homes, large buildings, factories and industrial plants Johnson Oil Burners are giving trouble-free, dependable, economical service. There is a size and type for every heating and power requirement.

You can recommend and use Johnson Oil Burners with the assurance that they will give enduring satisfaction day in and day out, year after year.

For behind every Johnson Burner lies the experience of more than 23 years in the exclusive manufacture of oil burning equipment. Scientific and precision methods of manufacture have won for Johnson Burners the world's highest award.*

The accumulated data of these 23 years is available to you. Our Engineering Department will welcome the opportunity of assisting you in the solution of your heating or power problems.



**Awarded Gold Medal, Sesqui-Centennial Exposition, Philadelphia, 1926, for "Excellence of workmanship and completeness of design."*

### *Oil Burning Equipment for Every Heating and Power Purpose*

Johnson Rotary Burners, with either manual, semi-automatic or full automatic control, are made in three styles and six sizes—giving a range of from 250 to 27,800 square feet of steam radiation or the equivalent. We also manufacture natural draft, whirlwind, low pressure air and steam atomizing oil burners; also electric and steam driven oil pumping and preheating equipment.

MEMBER OIL HEATING INSTITUTES OIL HEAT

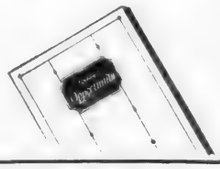
**S. T. JOHNSON CO.**

*Main Office and Factory,*
*940 Arlington St., Oakland, Calif.*
*Factory Branches: San Francisco, Sacramento, Stockton, Philadelphia*

YOU WILL FIND OUR LOCAL REPRESENTATIVE'S ADDRESS IN YOUR TELEPHONE DIRECTORY

# JOHNSON OIL BURNERS

*Listed as Standard by the Underwriters' Laboratories*



## SEND FOR THIS NEW BOOK—IT'S FREE

**Profits in the oil burner business are limited only by the market for the burner you represent. Our new booklet, "TODAY'S OPPORTUNITY," tells how you can build a profitable and substantial business. It shows you why the Johnson Franchise offers greater dealer profits. *Just write "Today's Opportunity," please—on your letterhead or business card and your copy will be sent without delay.***

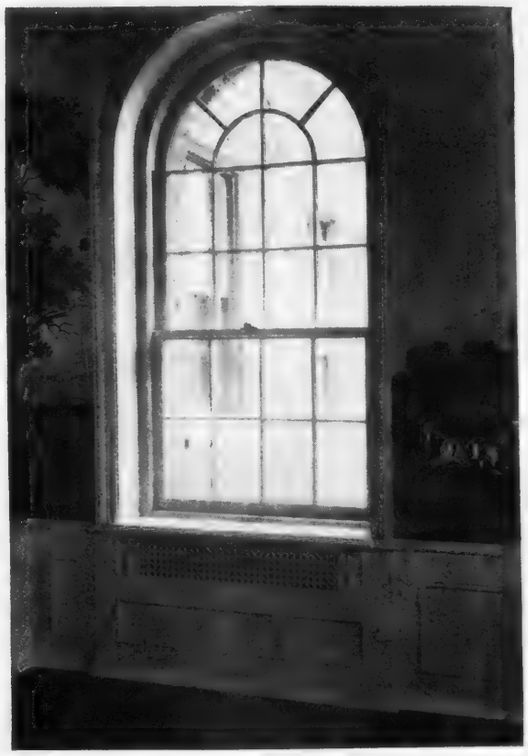
# Can I Use ROBRAS 20-20 RADIATORS In Remodeling Work?

To be sure. These radiators are ideally suited for remodeling work. They fit in the 4" space made possible by standard studding between the walls of any house. The radiators are in the walls, out of sight and out of the way. Exactly what the owner wants.

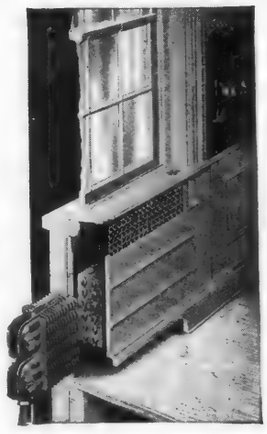
Robras 20-20 Radiators are a fifth the weight of equal cast iron radiation. Thus, they are much easier to carry in and install. In direct-indirect radiation, this light weight means substantial saving, not only in labor but in the cost of brackets and other materials necessary with cast iron direct-indirect radiation.

Because of the ease of installation in most heating jobs, Robras 20-20 Radiators cost the owner very little more. Yet *you* make much more. This is because of the speedy installation and because of the higher cost per square foot, with the usual trade discounts.

You should have all our data sheets, which give the proper measurements and dimensions for the different uses of this radiator. A note or postcard from you and we should be glad to send them.



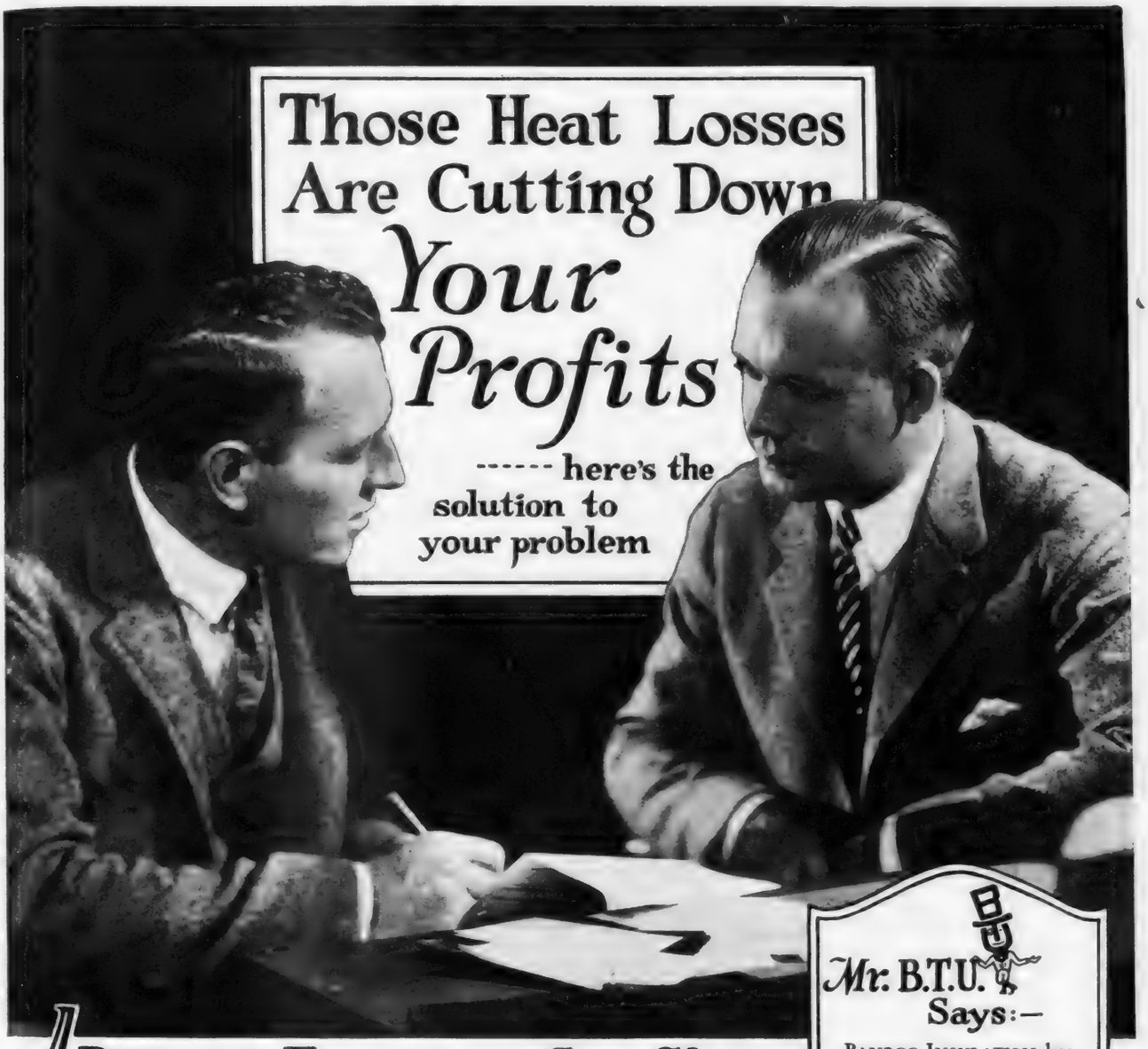
Radiators are inconspicuous, and out of the way, behind this wooden front, matching the woodwork. Every customer you have will appreciate such inconspicuous handling of their radiator problems.



How Robras 20-20 fits in a recess 4" deep, under the window. For different lengths of the sections, determine the ratings of these radiators.

**ROME BRASS RADIATOR CORPORATION**

ONE EAST FORTY-SECOND STREET :·: :·: NEW YORK CITY




# A Banroc Engineer Can Show You How to Cut Your Fuel Bills

LET a BANROC Engineer make a survey of the conditions in your plant. He will show you where your heat leaks are, and how to permanently, efficiently and economically stop them. Whether your trouble lies in your steam lines, boilers, breechings, ovens, or wherever you use heat, there is a BANROC Product made especially for it. Ask the BANROC Engineer to make you an estimate of the cost of insulating with BANROC and the heat it will save. No obligation.

**Mr. B.T.U. Says:—**

BANROC INSULATION has a conductivity rating given by the U. S. Bureau of Standards that makes it a leader in *Economical Efficiency.* It is this efficiency, plus permanence and economy that makes BANROC Products an outstanding value on the market.

*Banroc Engineers are listed in the Phone Directories of the following cities:*

BOSTON NEW YORK BUFFALO NEWARK DENVER PHILADELPHIA
PITTSBURGH CLEVELAND TOLEDO DETROIT LOS ANGELES
CHICAGO ST. LOUIS HOUSTON TULSA SAN FRANCISCO

BANNER ROCK PRODUCTS COMPANY, ALEXANDRIA, INDIANA

# BANROC INSULATION

ORIGINATORS - OF - ROCK - WOOL - PRODUCTS

WALL AND HANOVER BANK BLDG.
63 Wall St., New York City

DELANO & ALDRICH
Architects

CLYDE R. PLACE
Consulting Engineer

STARRETT BROS.
General Contractors

BAKER, SMITH & CO.
Heating Contractors

# Marsh Packless Radiator Valves

*used throughout on this job*

Packless Fig. 133

## MARSH VALVE COMPANY

**DUNKIRK** **NEW YORK**

***General Sale Distributors***

**Edward T. Hetherington**
1709 Sanson St., Philadelphia

**Appleton & Liptrott, Inc.**
1480 Broadway, New York

**John W. Mabbs**
431 So. Dearborn St., Chicago, Ill.

**United States Radiator Corp'n**
General Offices: Detroit, Mich.

**SARCO COMPANY, Inc.**
183 Madison Ave., New York

**Taylor-Forbes Company**
Canadian Agents Guelph, Ont.

# Factory Production Costs Are Materially affected By Degree of Heating Efficiency

*Heated air horizontally discharged at high velocity just above breathing zone—*

*Warm air in breathing zone is constantly falling downward as—*

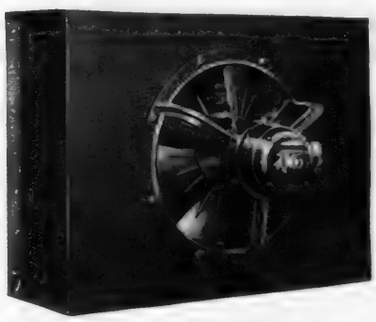
*Cool strata of air is drawn in and upward through recirculating box to be revitalized and reheated and discharged again above breathing zone.*

*Massachusetts Type H Unit Heater with Recirculating Box for Floor Mounting.*

MASSACHUSETTS

UNIFORM, economical, healthful heat, at all times, under all conditions is the never-ending dividend paid from an investment in Massachusetts Unit Heater of the type required.

There is a Massachusetts Unit Heater to meet every heating requirement. We build both ceiling and floor types, utilizing either steam or hot water. Our engineers will be glad to recommend the type best adapted to your requirements.



*Massachusetts Type H Unit Heater Inlet Side for ceiling suspension.*

THE BISHOP & BABCOCK SALES CO.
*General Offices—4901-4915 Hamilton Ave. N. E.*
CLEVELAND, OHIO

SALES AND SERVICE OFFICES

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*Write for Catalog No. 56 describing details of all types and their applications*

BISHOP & BABCOCK
TEMPERATURE REGULATION
HEATING SPECIALTIES VENTILATING EQUIPMENT

# *Announcing–*
# ILLINOIS
# ZONE HEAT CONTROL

The added refinement of zone heat control to ILLINOIS *Heating Systems* through the use of Automatic Master Control Valves on branch mains under the Hornung patents.

With ILLINOIS *Zone Heat Control* the following results are positively effected:

Hornung Master Control Valve

1. Heat on or off of any section of building by automatic thermostatic control.
2. Oil Burner, Stoker or Draft Dampers operated automatically in accord with steam demand.
3. Vacuum Pump automatically controlled to start, maintain vacuum in returns at fixed ratio to pressure in supply mains, or stop, according to operating demands.

*It will be to your advantage to learn of this advanced development in heating*

CORRESPONDENCE INVITED

*Visit our Booth at the* NEW YORK POWER SHOW

REPRESENTATIVES IN 40 CITIES OF U.S.A.

ILLINOIS ENGINEERING COMPANY

ROBT. L. GIFFORD President INCORPORATED 1900

CHICAGO

# At Your Service
# . . . . . *on any Heating Job*

Is this portfolio on "Roof Insulation and Prevention of Condensation" in your files? If you have not received a copy, please write for it to-day. It contains accurate charts and much helpful data on proper insulation and the prevention of moisture condensation—all being an essential part of any heating job.

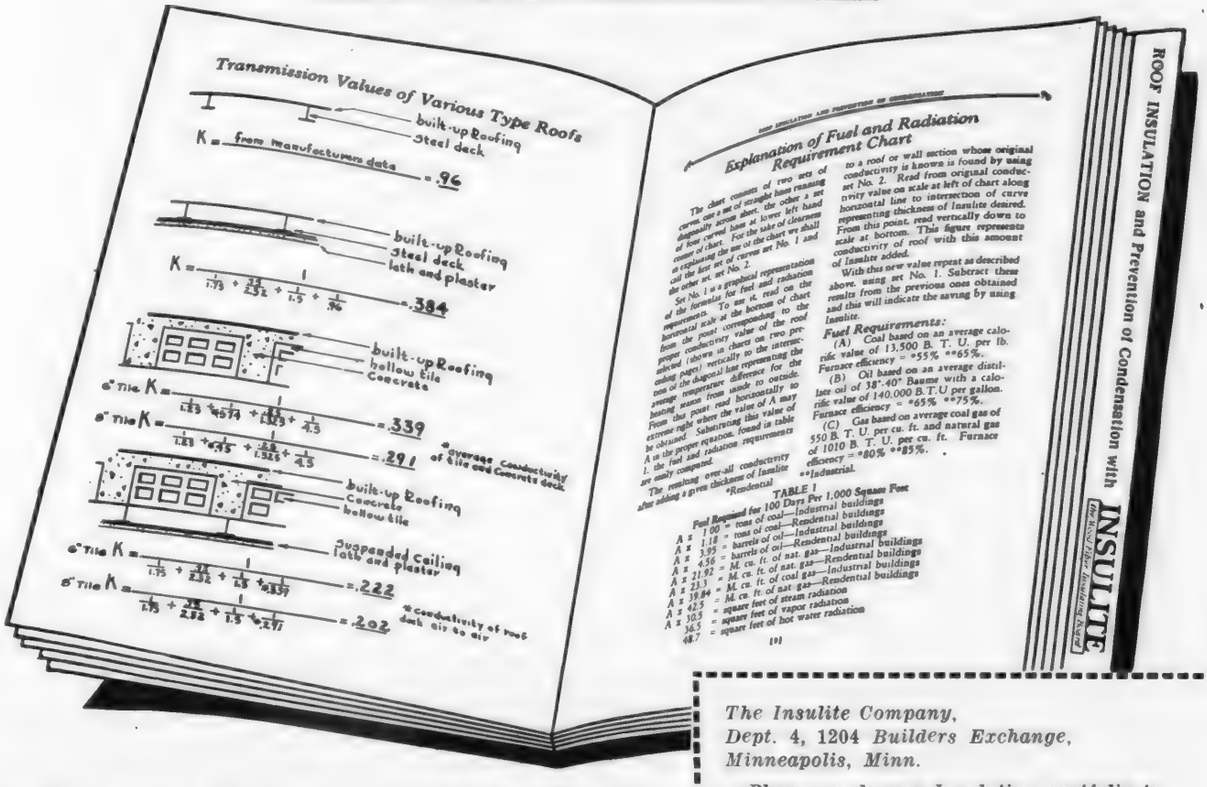
INSULITE roof insulation has helped many heating engineers. The portfolio is a constant source of information, and our engineering department will be glad to give assistance in connection with special problems.

INSULITE roof insulation comes in one-inch and one-half-inch thicknesses. Has great strength, great heat-resisting value, is easy to handle and work with. No waste through breakage. Not injured by exposure.

***Write for the portfolio or ask for any specific help***

**INSULITE**

***the Wood-Fiber Insulating Board***




**THE INSULITE COMPANY**

**1204 Builders Exchange, Dept. 4**

**MINNEAPOLIS MINNESOTA**

*The Insulite Company,*
*Dept. 4, 1204 Builders Exchange,*
*Minneapolis, Minn.*

*Please send your Insulation portfolio to*

*Name*.....

*Address*.....

*City*.....*State*.....

# The Dunham Differential Vacuum Heating System

## In the Edgewater Beach Apartments, Chicago

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*H. L. Clute, Consulting Engineer* — *Thos. J. Douglass Co., Heating Contractor*

A PROJECT of the first magnitude, the Edgewater Beach Apartments, nearing completion and located north of the Edgewater Beach Hotel, will be heated with a Dunham Differential Vacuum Heating System. The selection of this System was made by the owners and architect after a most searching investigation. In this 20 story building there are 88,000 sq. ft. of direct radiation. We understand this is the largest *low pressure* heating installation in the world. Tenants of the 296 apartments of four, five, six and seven rooms this winter will have the benefits of Sub-Atmospheric Steam that never overheats, yet always supplies the proper amount of comforting warmth—the system actually supplying cool steam in mild weather and hot steam in cold weather. The resulting benefits will delight every tenant and at the same time effect substantial savings in fuel over the amount that would be consumed by other systems of heating.

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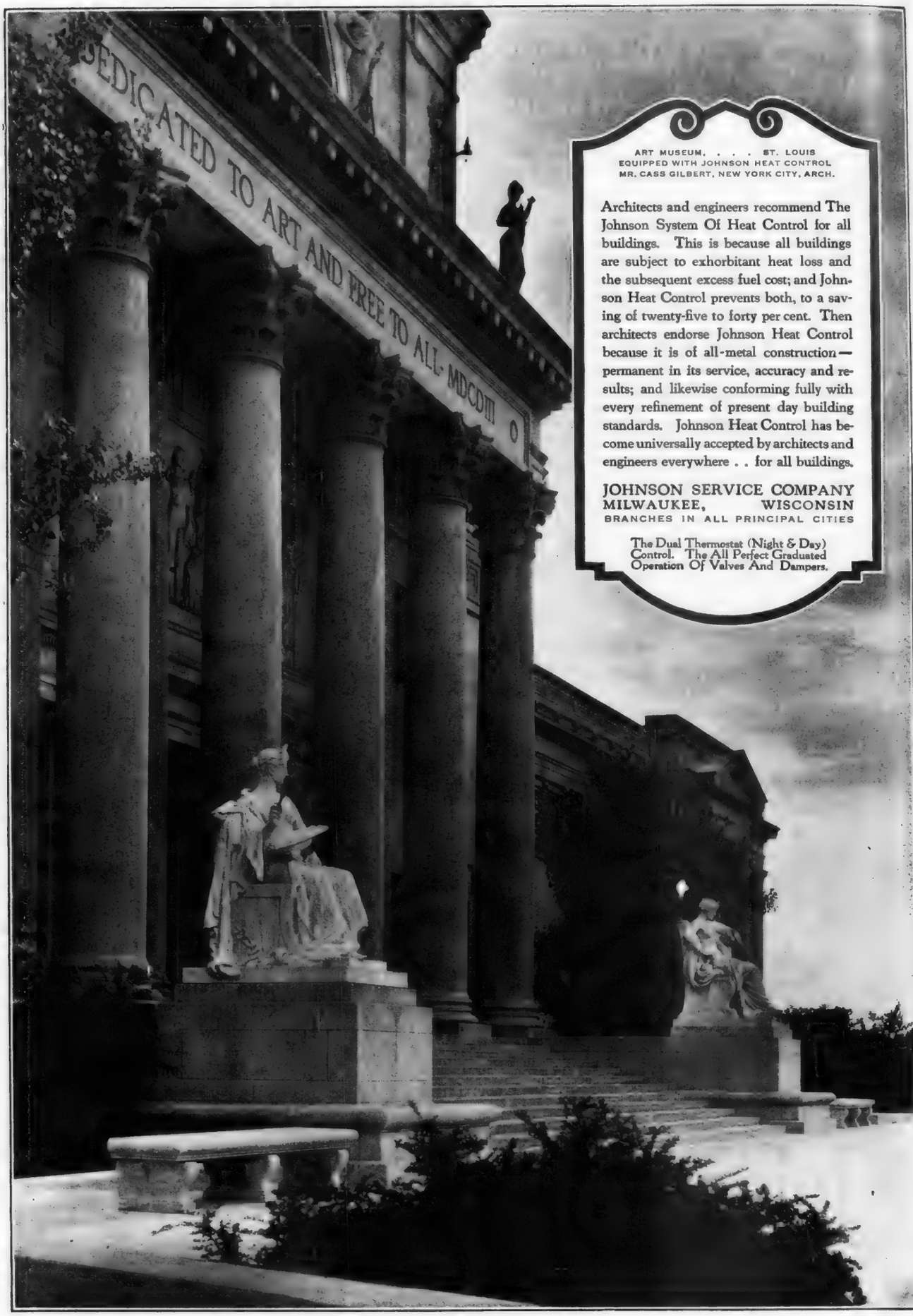


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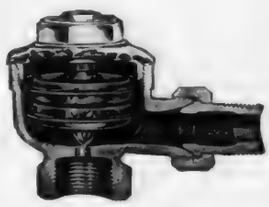

*Barnes & Jones Return Valve*

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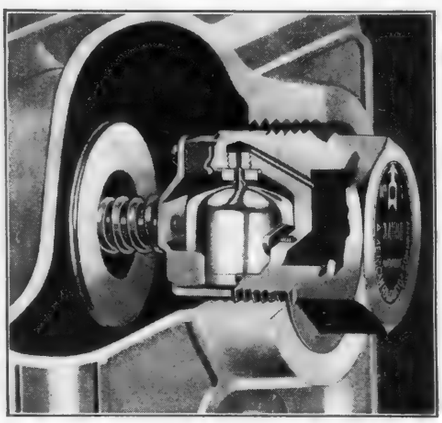
# *New* IN-AIRID AIR VALVE Scores Sensational Success

## *The immediate response of the trade a great tribute to a new idea . . . .*

IN a remarkably short time — less than three months since it was first announced — the new In-Airid Air Valve has taken the market by storm. Never before in our forty years of experience has any heating accessory been accepted so readily and so enthusiastically as the In-Airid.

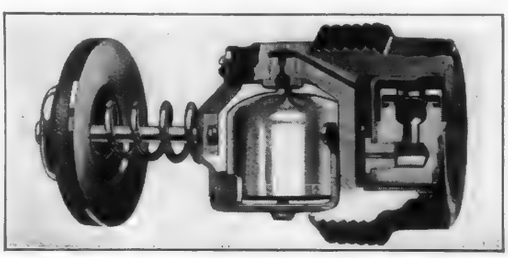
Many dealers and distributors who placed small trial orders when the valve was first announced are now reordering in large quantities. And the new venting principle has been so widely recognized as a necessity for better radiator heating that already other leading radiator manufacturers are selling In-Airids.



*Cutaway view of In-Airid Air Valve installed in last section of new water—for—steam type radiator*

There are reasons for the instant success of the new In-Airid. It is a radical departure from all previous types of venting valves—not just another air valve.

Fits all new type radiation—Prevents short circuiting—assures complete venting of all the air—makes all sections hot—Entirely invisible, thereby improving the appearance of the radiator—Dry venting—In-Airid is in the driest part of the radiator, yet, should water reach it the float closes instantly—Cannot "water log"—no siphon necessary, because there is no shell to hold water—Cannot be damaged because all working parts are within the section—Cannot be stolen or turned upside down—preventing operation—No hissing—no leaking of steam or water—Will not clog with dirt because it is in the cleanest part of the radiator—yet when necessary can easily be cleaned if clogged under abnormal conditions—All metal. Nothing to wear out—Requires no adjustment and cannot be tampered with—Easily installed—Inexpensive.



*Cutaway view of In-Airid No. 2 Vacuum Valve*

### *For Vacuum Jobs— In-Airid No. 2*

The new In-Airid is made in two models—No. 1 for steam, No. 2 for "below atmosphere" jobs. The No. 2 has all of the venting features of No. 1 plus the vacuum seal with hand lapped monel disc and seat. The valve vents with only a slight boiler pressure. But, as the steam goes down, the valve closes tightly, creating a partial vacuum and retaining heat for hours after the fire is banked.

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ELECTRIC-WELDED STEEL HEATING BOILERS

# The Heating & Ventilating Magazine

Volume XXV

Reg. U. S. Pat. Off.
Reg. Canadian Pat. and Corp't Off.

Number 12


*Contents of previous issues of* THE HEATING AND VENTILATING MAGAZINE *can be found by consulting the Industrial Arts Index at the nearest library.*

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## *Percentages*

ONE of the popular indoor sports these days is the calculation of the percentage of worth-while heating contracting firms among the 35,000 so-called "plumbing and heating contractors" in the United States. Estimates based on carefully-compiled statistics range all the way from 33% down to 16%. Our own estimate, by the way, is 16%.

Of course, it all depends on what you mean by "worth-while." Let us assume that it means those who, between them, do 80% of the heating business in their respective localities. On this basis it is easy to reach 33% in this wise:

| | Proportion of firms doing 80% of the business |
|---|---|
| Large cities | 16% |
| Medium cities | 33% |
| Smaller cities and towns | 50% |
| Average, 33% | |

But let us assume it means those who do 80%, in dollars and cents, of the country's business in their particular field. The percentage in the larger cities remains as it was, while in the medium cities it is reduced a bit, and in the smaller cities and towns it is cut down very materially. We then have this set-up:

| | Proportion of firms doing 80% of the business |
|---|---|
| Large cities | 16% |
| Medium cities | 20% |
| Small cities and towns | 12% |
| Average, 16% | |

That is, 16% of 35,000 equals 5600, which is the number of firms constituting the bulk of the market in the heating contracting industry.

Even this is a liberal estimate when you consider that the country's total annual budget for new construction is about $6,000,000,000, of which the heating and ventilating work constitutes 10%, or $600,000,000. Taking 80% of this figure and dividing it among 5600 contractors, gives $86,000 as the average yearly business of each member of this group on new construction—and that is spreading it thin enough.

A. V. Arnquist

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**Radiator Traps, Inlet Valves and Temperature Regulators**

A MONTHLY JOURNAL OF ENGINEERING PROGRESS

The Heating & Ventilating Magazine

Volume XXV DECEMBER—1928 Number 12

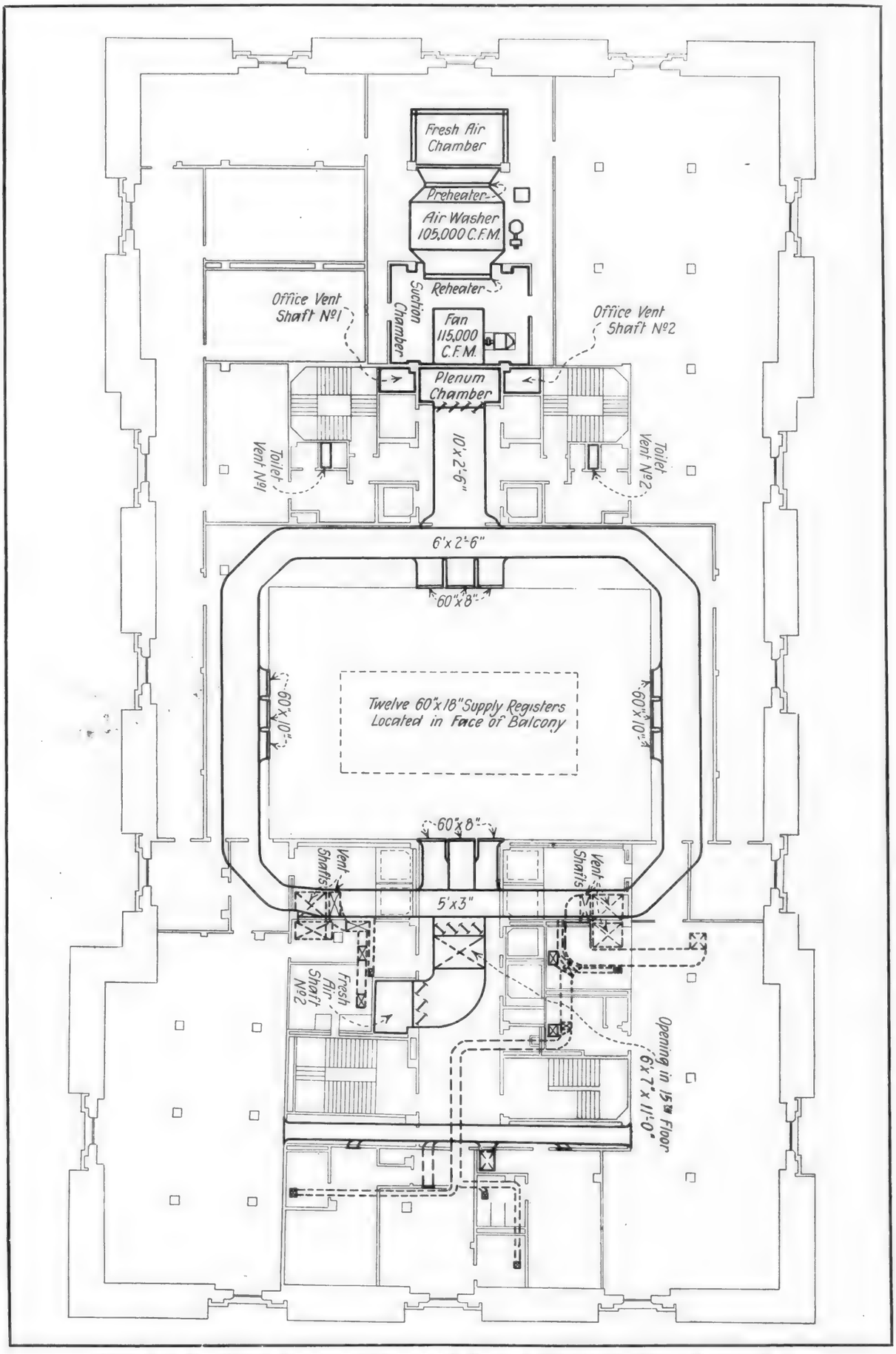
# Downward Ventilation for an Office Building

## Insurance Company Sets Example by Providing Adequate Air Supply for Its Personnel

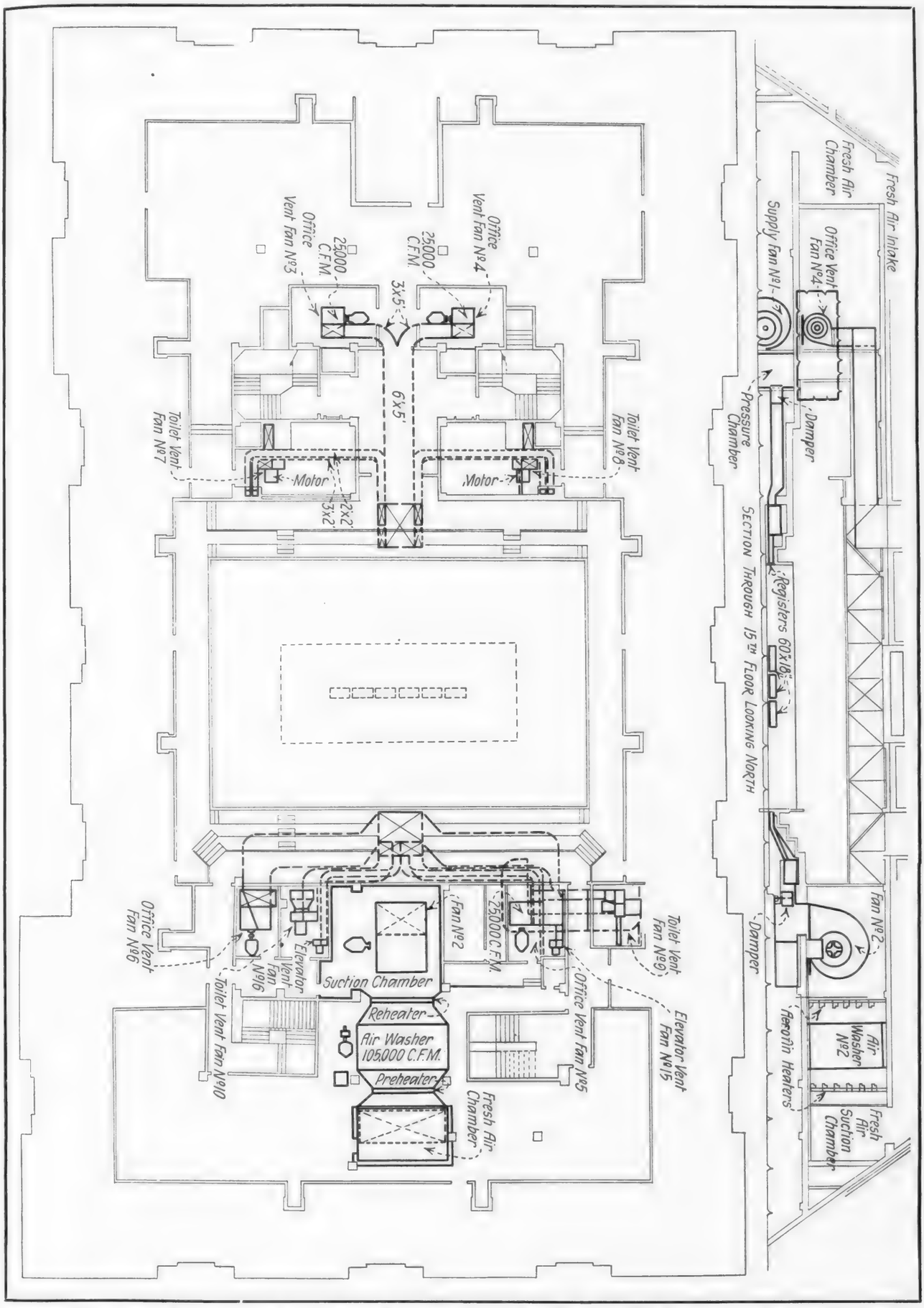
**By *Samuel A. McGuire***

*Chief Mechanical Engineer, Office of Cass Gilbert, New York*

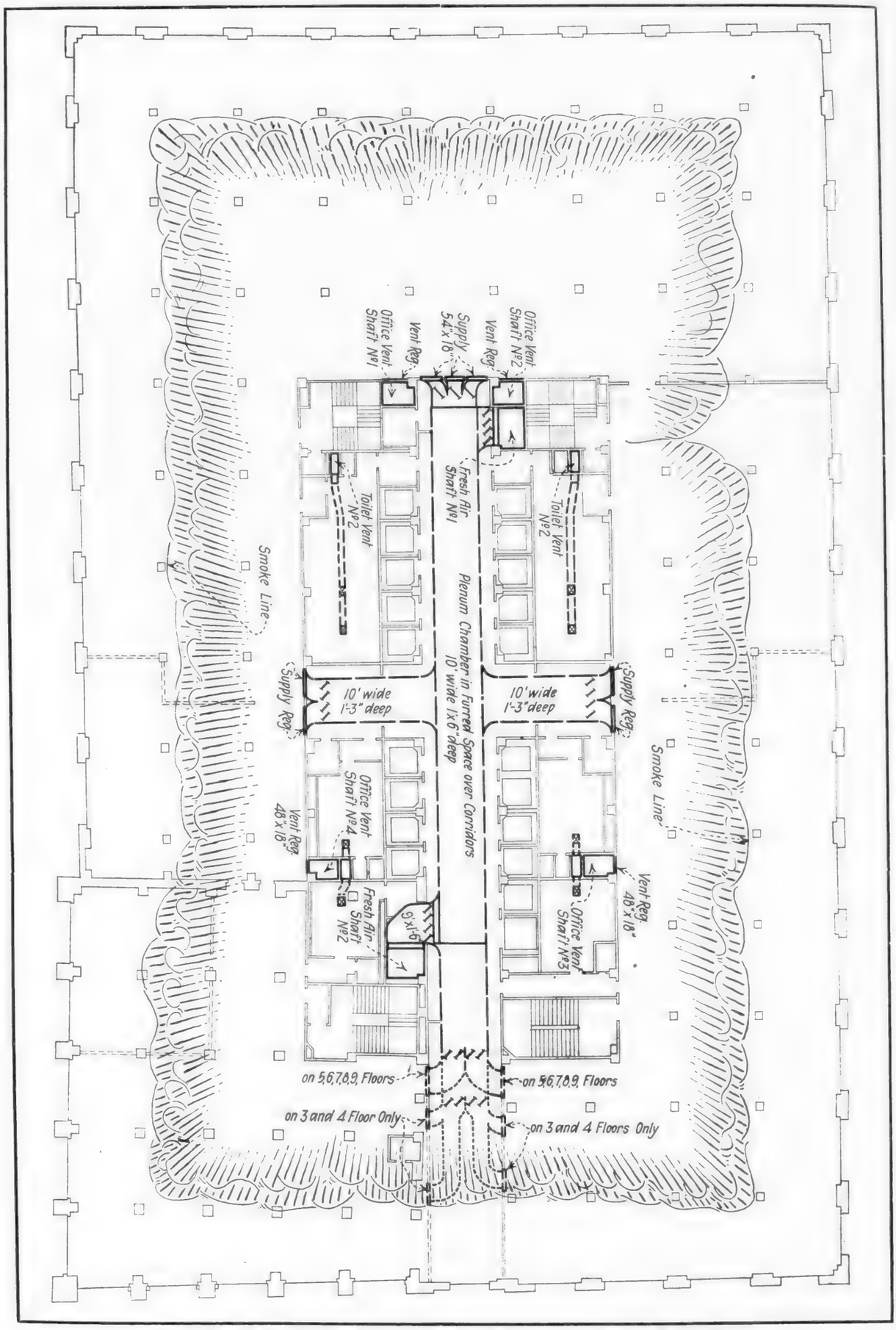
IN the Gibraltar Building of the Prudential Insurance Company in Newark, N. J., a downward system of ventilation supplies a steady stream of conditioned air to practically every floor of the structure. The building is the latest of the Prudential group in Newark, and covers the entire block bounded by Halsey, Academy, Washington and Bank Streets. It measures approximately 170




**Method of Ventilating Gymnasium, Fourteenth Floor of Gibraltar Building, Newark, N. J.**




**General Arrangement of Ventilating System, Fifteenth Floor, Gibraltar Building, Newark, N. J.**


Office Vent. Shaft No 1
Vent Reg.
Supply 54"x 18"
Vent Reg.
Office Vent Shaft No 2
Fresh Air Shaft No 1
Toilet Vent No 2
Toilet Vent No 2
Smoke Line
Plenum Chamber in Furred Space over Corridors 10' wide 1'x 6" deep
Supply Reg.
10' wide 1'-3" deep
10' wide 1'-3" deep
Supply Reg.
Smoke Line
Office Vent Shaft No 4
Vent Reg. 48"x 18"
Fresh Air Shaft No 2
9"x 1'-6"
Office Vent Shaft No 3
Vent Reg. 48"x 18"
on 5,6,7,8,9 Floors
on 5,6,7,8,9 Floors
on 3 and 4 Floor Only
on 3 and 4 Floors Only

**Typical Floor Plan Showing Air Distribution as Determined from Smoke Test**
Direct radiation in front of windows not shown.

View of Gymnasium on Top Floor of Gibraltar Building, Newark, N. J., with Ventilating Grilles Shown on the Side Walls

ft. x 281 ft., is 15 stories high above the sidewalk, and contains one basement floor. The first floor, as well as part of the basement, is devoted to stores. It contains 19 stores, and the remainder of the building is occupied solely by the Prudential Company.

Exclusive of the stores on the main street level, the building is mechanically ventilated throughout. Fresh air is brought in above the roof level into a suction chamber at each end of the building, i. e., one at the Washington Street and one at the Halsey Street end. Two Buffalo Conoidal fans, of the double-width and double-inlet type, handle the main air supply. One supply fan is located on the fifteenth floor and the other on the fourteenth floor. In the suction chambers are dry filters, preheaters, air washers, humidifiers and reheaters. Air washers are of copper and the heaters are of Aerofin manufacture. The incoming air passes through these various devices before it reaches the supply fans, each of which has a capacity of 115,000 C.F.M. and is driven by a 70-H.P. motor.

The discharge side of the fan connects with vertical ducts of masonry construction. The air is delivered downward into a plenum chamber which is the full area of each floor corridor, and is then discharged through registers into the working spaces at each end and each side so that there are four sets of discharges at each level.

Exhaust air is taken from various points near the floor around the utility sections of the building, and is drawn to the roof by means of four exhaust fans placed in the upper levels, the ducts being brought together at that point. The discharge is above the roof at a point about midway between the intakes, or sufficiently distant to have no influence on the fresh incoming air.

Four fans handling the toilet ventilation discharge at different points on the roof. The elevator machine rooms are ventilated with small units, having a capacity of 2500 C.F.M.

### Mechanical Ventilation for Interior While Infiltration Takes Care of Outer Space

In the design of the ventilating system provision was made for air changes back of the first exterior bay, the first bay depending on infiltration. Actual tests of the apparatus indicate that the system has carefully been installed, is well balanced, and ventilates practically as designed. Tests were made to check up the air deliveries of the fans, the static pressure, motor speed and current consumption, together with anemometer and smoke pot tests at the registers, the result of which indicated the proper movement and supply of air, as illustrated on the accompanying drawing of a typical floor plan. These tests showed a remarkable uniformity of air distribution and indicated that the design calculations were correct. The effect of infiltration through the walls is indicated by the white space around the edge of the accompanying drawing. This drawing does not show the direct radiators placed along the outside walls.

The building itself, as well as the mechanical equipment, was designed by Cass Gilbert, architect. H. Kelly & Co., of Minneapolis and Detroit, are the heating contractors.

# Training *the Apprentice and Engineer for the* Heating Industry

The Company of *Founders*, no doubt of Antiquity and long Continuance in Brotherhood and Fellowſhip together, were incorporated the 18th of *Sept.* 12th of K. *James* I. They beat Azure, an Ewer between two Pillars, Or.

By F. P. Elliott

*SIX centuries ago the apprentice served his time under conditions of virtual slavery. The custom was that "Every apprenticeship shall pay a silver spoon to the Gild and shall give a breakfast to the Maister and Wardons, when he becomes a free man." Today conditions are vastly different, as will be shown in the following articles of this series.*

The Company of *Plumbers*, of very memorable Antiquity, remaining a Fellowſhip or Brotherhood, at length became incorporated by Letters Patents the 11th or 12th of *April*, in the 9th Year of K. *James* I. They bear for their Enſigns Armorial Or, on a Cheveron between a Mallet Sable and two Plummets Azure in Chief, and a Level of the ſecond in Baſe, two Sodering Irons in Saltire, between a cutting Knife and a Shave-hook, Argent.

**These Two Records of the Birth of Modern Labor Organizations Are Reproduced from an Ancient Volume in the New York Public Library.**

IT would be difficult to find a more illuminating example of the boundless educational opportunities, open alike to rich and to poor, than in the case of artisans and engineers in the various trades and industries that compose our industrial fabric.

Going back to early days, before the scientifically trained engineer came into the picture, craftsmanship was the result of long and arduous training, usually in the form of apprenticeship. In the earliest days the set-up was one of extreme simplicity. The arrow-maker's successor was his son, and he, in turn, trained his male descendant to carry on this highly specialized craft. The pipe maker also was a specialized workman, when pipes, arrows and hatchets might be said to have constituted the world's industrial output. It is almost incredible to us, living in a period where the rate of advancement is so far in advance of these early days, that the industry's work should go on, literally for centuries on end, without material change in the processes by which craftsmen came into being. Certain it is that the plumbers' apprentice of only 50 years ago would be hard pressed to appreciate and realize the opportunities that make easy and rapid the path of the learner of today. As a contrast, the apprentice of 50 years ago probably would be very familiar with the conditions under which his predecessor of two or three centuries worked, so slow was the rate of development during the five or six centuries ending 29 years ago.

It is proposed in this outline first to picture the forerunner of the steam-fitters' apprentices of today, briefly to outline his place in the industry, and to show under what tremendous handicaps he struggled. The next picture on the screen will show the steam-fitters' apprentice of today working in technical trade schools and actually being paid for acquiring an education and for qualifying himself to take the place of his employer. The final picture will be that of the young man who feels that brain is better than brawn and who determines to train himself to occupy executive or engineering positions in the great industrial units that mark the pinnacle of today's progress.

In talking recently with a heating contractor of British origin, it seemed to me a significant fact that this man himself had been "bound out" to learn the steam-fitters' trade, his father paying a bonus for this privilege that even today seems incredibly high. It is a matter of wonder that we have passed, within the short span covered by this man's working life, from a condition where young boys were indentured for long periods, frequently under conditions approaching reformatory life, to a condition where training for a highly specialized craft is directed by trade unions, assisted by educational officers of the state, and where at least a major portion of the work is carried out in schools little less than wonderfully equipped.

It is not necessary to trace the origins of the old British labor organizations under which apprentice training was nurtured. However, it is a matter of passing interest that the two organizations that must be looked upon as forerunners of the present-day steam-fitters' associations, officially date back to the early part of the seventeenth century. In a musty volume in the New York Public Library is found an official record of the incorporation of "The Company of Plumbers" in the year 1612, and of the origin of the "Company of Founders" three years

later. As the old record naively puts it:

> "The Company of Plumbers, of very memorable Antiquity, remaining a Fellowfhip of Brotherhood, at length became incorporated by Letters Patents the 11th or 12th of April, in the 9th Year of K. James I. They bear for their Enfigns Armorial Or, on a Cheveron between a Mallet Sable and two Plummets Azure in Chief, and a Level of the fecond in Bafe, two Sodering Irons in Saltire, between a cutting Knife and Shave-hook, Argent."

The first legal recognition of the Company of Founders, and a description of its coat of arms, as taken from this musty tome is as follows:

> "The Company of Founders, no doubt of Antiquity and long Continuance in Brotherhood and Fellowfhip together, were incorporated the 18th of September 12th of K. James I. They bear Azure, and Ewer between two Pillars, Or."

One familiar with trade-union literature during any of our periodic labor upheavals might imagine that internal troubles were of comparatively recent origin. That this is far from being the truth is shown by a quotation from the "Ordinances of the Plumbers," issued in 1365:

> "No one of the trade of plumbers shall meddle with works touching such trade within the said city, or take house or apprentices, or other workmen, in the same, if he be not free of the City; and that, by assent of the best and most skillful men in the said trade, testifying that he knows well and lawfully to work, and to do his work; that so, the said trade may not be scandalized, or the sommonalty damaged and deceived, by folks who do not know their trade. Also, that no one of the said trade shall take an apprenticeship for less than seven years; and that he shall have him enrolled within the first year, and at the end of his term shall make him take up his freedom, according to the usage of the said city."

From the foregoing it is evident that undesirable trade practices were rampant in these riotous days of Edward III.

It will interest the apprentice, who today receives his diploma and a shake of the hand from the head of a recognized training school, to know that in the old days:

> "Every apprenticeship shall pay a silver spoon to the Gild and shall give a breakfast to the Maister and Wardons, when he becomes a free man."

Shedding only a faint light upon the almost intolerable working conditions of those days is a petition preserved in the British Museum:

> "And first we beseech your honours to take into consideration the intolerable abuse of our apprenticeship: for where we by coercion are necessarily compelled to serve seven or eight years at least, before we can have the immunity and freedom of this city to trade in: those which are mere strangers do snatch this freedom from us, and pull the trades out of our hands, so that by these means, when our times are fully expired, we do then begin in a manner to suffer a second apprenticeship to them, who do thus domineer over us in our own trades."

Admitting that the labor unions of today may be held in ill repute for sins of ommission and commission, the situation, so far as the apprentice is concerned, is a vastly different one from that of his prototype during the early days of the "Ancient and Honourable Company of Plumbers." Tremendous strides have been made during the last few years in developing courses of training for artisan apprentices, and, in nearly every case, the prime mover has been a labor organization or trade union.

It may come as a distinct surprise to many not familiar with developments in this line that more than 10,000 apprentices, during the coming year, will participate in highly specialized courses of training designed to develop them into high-class artisans with elementary business training.

There are approximately 175 training schools, most of them located in cities of 50,000 population or over. In only seven states is apprentice training neglected. The National Association of Master Plumbers, through its apprenticeship committee, reached over 6000 apprentices last year, held four state-wide conferences and 32 joint apprenticeship conferences, which were attended by artisans, employers, and representatives of state or civic educational institutions. Text books have been prepared for students in both heating and plumbing industries and it is anticipated that, within three or four years, the program will be crystallized, standardized, and spread over the entire map of the United States.

As might be assumed, the evolution of the present-day training system for artisans has been a gradual one springing from two or three groups of men whose far-sightedness caused them to initiate such activities several years ago.

It will be the purpose of the second of this series of articles to tell the story of the development of these various training schools and to outline their present scope.

Quite a contrast is apparent when a study is made of the methods of training apprentices in Europe, particularly in Great Britain, where many apprentices between 14 and 16 years of age are recruited. Nearly one-half of the apprentices, reported in one study of apprenticeship in Great Britain, were indentured at 15 years or under to serve for at least five years. The second article will include an outline of the present-day methods of procedure and training in Great Britain. The third article will deal with courses of training in the important engineering schools of the country where optional courses are available pertaining to heating and ventilating, or where specialized schools covering this field have been established.

(*To be continued*)

# What Pressure Steam Distribution for Tall Buildings

*By Harold L. Alt*

Courtesy Architectural Forum — Charles Z. Klauder, Architect

**"Cathedral of Learning," University of Pittsburgh**

THE usual practice in heating high buildings is not only to use the down-feed system but also to carry steam to the upper sections at comparatively high pressure and then to pass it through reducing valves so that the horizontal distribution mains and the vertical drops from the horizontal lines are at the normal and desired heating pressure. This is shown diagrammatically in Fig. 1.

Many engineers feel that this is the best system so far as combating high cost and excessive pressure-drop is concerned. Possibly they are justified in this feeling, being influenced by precedent, although they may be somewhat disturbed by the unusual distances that the steam has to travel before reaching the last radiator.

But it is just as practical to use low-pressure steam, which, in some ways, is even superior to high-pressure for buildings of excessive height.

### Advantages of High-Pressure Steam

What are the considerations which indicate that high-pressure steam should be used in such instances? That is, in what manner is high-pressure superior to low-pressure in delivering steam to the top of the building? First, because the pipes can be smaller and the allowable drop greater. It is evident that, with an initial pressure of 50 lbs. or 100 lbs., it is possible to have 10, 20 or even 30 lbs. drop with no detrimental results, as there still will be plenty of pressure left for the heating system.

It follows that smaller pipes mean lower initial cost. So the factor of installation, or first cost, is in favor of high-pressure transmission.

### Disadvantages of High-Pressure Distribution

Under the head of disadvantages must be listed a greatly-increased amount of expansion, which is a matter not always easy to take care of, because —as a general thing—expansion joints must be employed and these are much more likely to give trouble under high pressure than under low pressure.

The higher pressure also makes it necessary to almost double the number of expansion joints in the vertical risers owing to the increased amount of expansion to be provided for; this is assuming that the same amount of movement is absorbed in each expansion joint in both cases.

A second point against high-pressure steam is the fact that there is a greater heat loss from the line, usually compensated for by using a higher grade or a more efficient pipe covering. But this neutralizes some of the savings made in the reduction in pipe size.

Another point against high pressure is the introduction of an entirely separate system of drips and high-pressure traps. These drips cannot be connected to the radiator returns under any consider-

ation but must have a separate line carried back to the boiler-room with a correspondingly greater heat loss, due to their high temperature.

Another objection is the introduction of numerous pressure-reducing valves, one of these being placed on every branch from the main high-pressure risers, and equipped with the usual three-valve by-pass. As a matter of fact, and to insure a continuance of heating service, such reducing valves should be installed in duplicate.

Again, the delivery, into the low-pressure mains, at a point comparatively close to the radiators, of superheated steam, is a matter which cannot be overlooked, as superheated steam plays havoc with the thermostatic radiator trap.

The last point against the use of high pressure is the fact that in cases where the low-pressure line fills with the steam at a higher pressure, the operating engineer in the basement has no way of knowing why the pressure reducing valve for that section failed to function. It would not be at all impossible to raise the radiator pressure to a point where the thermostatic traps—every trap, in fact, which that particular reducing valve supplied—would be permanently damaged.

Practically no thermostatic radiator traps are guaranteed for pressures in excess of 25 lbs. and very few for even that amount. Consequently, the danger to the radiator traps is two-fold; from superheat and from excessive pressure. Both are possibilities with high-pressure steam.

Of course, it is assumed that a safety valve has been installed on the low-pressure side of the reducing valve but who tests this valve regularly to keep it from freezing and sticking? Even assuming that the safety valve works perfectly, what is the result? When it blows off, it fills the pipe shaft with steam, making it necessary to shut down the entire high-pressure riser and wait until all steam pressure is off the line, as well as cleared out of the pipe shaft before the reducing valve can be approached with safety.

### On the Low-Pressure Side

But would the use of low-pressure steam obviate these difficulties, and could it be used with no greater difficulty than a slightly higher first cost? The answer is "yes," without the slightest hesitation.

Low-pressure transmission *does* increase the initial cost somewhat, but not as much as would at

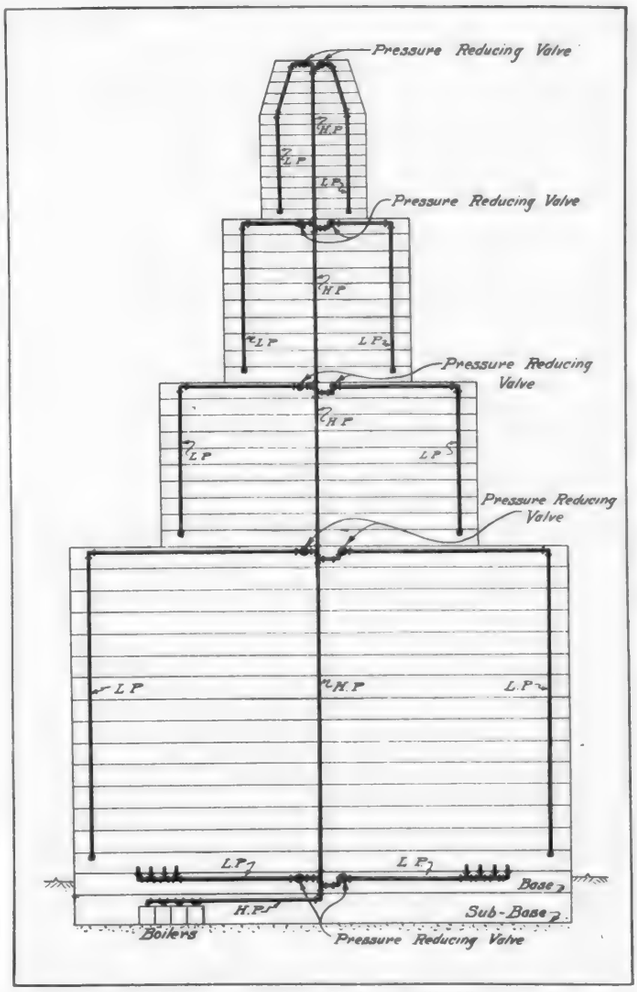



Fig. 1. Typical Arrangement of High-Pressure Steam Supply Riser and Low-Pressure Distribution

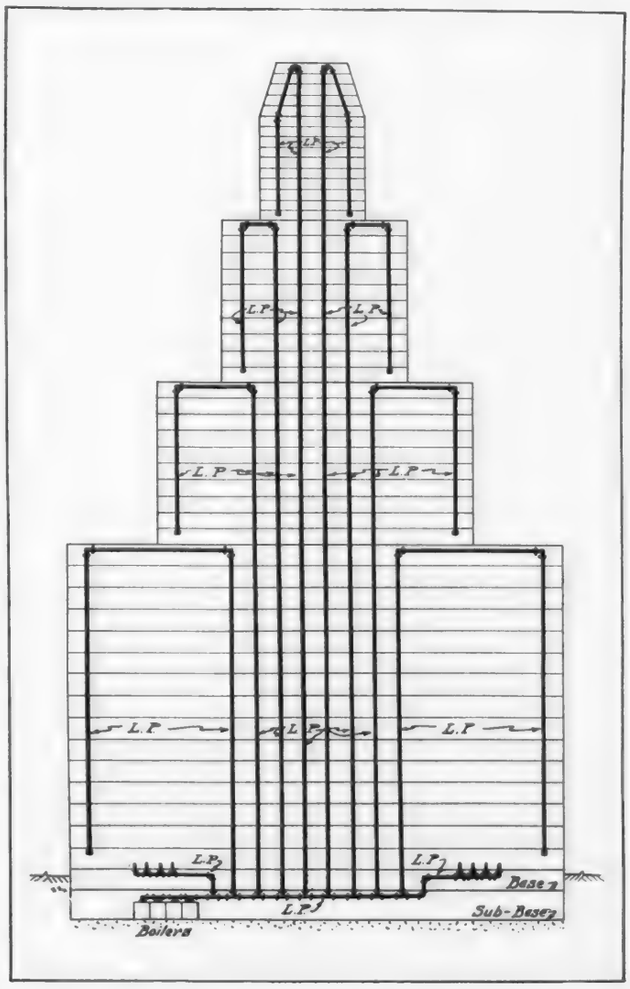



Fig. 2. Typical Arrangement of Low-Pressure Steam Supply Mains and Risers

first be supposed. Against the increased diameter of pipe there are the factors of cheaper covering, elimination of some of the expansion joints, the doing away with high-pressure traps and a separate H.P. drip system, and other minor savings, such as reducing-valves, safety valves, by-passes, etc. So that as far as cost goes, the difference, although in favor of high pressure, is not *overwhelmingly* so.

The next feature is that the engineer in the boiler room can tell exactly the pressure on all steam lines to radiators and even can adjust this pressure if he so desires. Neither is it necessary for him to keep up a constant inspection to see if the reducing valves in the upper part of the building are O. K. and if the radiator pressures are what they should be.

"But in large buildings the size of mains grows excessive," says the engineer. Well, it is not necessary to put the building all on one main; in fact, it is poor engineering even to contemplate such an arrangement. Instead, the various sections should be supplied from separate risers, as shown in Fig. 2. This automatically will answer the objection of excessive pipe size.

"What about the pressure-drop?" asks another engineer. Well, there is no run over 2000 ft. long in the highest building unless the boilers are installed somewhere in the next block. What does 2000 ft. of run signify? Horizontally laid out, many group building installations exceed this figure with never a question raised. It looks larger when it runs up in the air, but the buoyancy of the steam helps out on the vertical riser where it does not aid at all on the horizontal run.

In conclusion, it might be said that the highest building ever projected was laid out for low pressure steam *from* the boiler room wall *to* the last radiator. There was not a steam pressure outside of the boiler room of more than 2 lbs. permitted anywhere in the structure. This building was designed by a competent engineer, while the plans were checked by one of the largest heating organizations in the country and were fully approved by them.

It may be pertinent to add that the heating system proposed in the building in question is one which normally operates with a negative pressure in the mains and radiators so that any break in the lines would only spoil the vacuum and the leakage would be inward and not outward.

## The Changing Picture

THE use of refrigeration for maintaining comfortable living conditions in the home during extremes of summer heat will be a development of the very near future. It will be an improvement which can be applied to the home of the average man as well as to that of the wealthy. The application of thermal equipment for comfort in the home is of more importance than for office buildings or theatres, yet it has received far less engineering attention.

The home of the the future will, in my opinion, be heated largely by air warmed directly by a gas or an oil-fired furnace, the warm air being distributed by noiseless low-pressure fans.

Such furnaces can now be built of rust-proof light-weight steel at a relatively low cost, and will operate with an efficiency of approximately 90%, under all conditions. This form of heating, then, becomes a serious competitor of coal-fired steam systems, from the standpoint of economy as well as ease of operation.

With this type of heating it is a relatively simple matter to attach air cooling by refrigeration, permitting the entire equipment to be centrally located in the basement. Gas heat affords the ideal means for the production of such refrigeration, in place of a power-driven compressor.

Some safe and simple absorption system may be developed, or an ejector type of system, using water as a refrigerant, may be the ultimate design, but, in any case, I venture to predict it will soon be possible to press a button and place your house-heating system in operation under automatic control, or to press another button to start your house-cooling system, as required. This will bring the benefits and comforts of the mountains or sea shore to our homes in summer, as well as the climate of Florida to our dwellings in winter—all at an overall installation cost that will not greatly exceed the cost of installing a modern, satisfactory steam or water-heating system of heat distribution.

There also is another practical possibility involving the use of a refrigerating type of equipment for heating processes. The possibility was first proposed by Lord Kelvin.

It is well known that the amount of heat transfer from the evaporator to the condenser of the refrigeration machine may be several times the heat equivalent of the power employed, this being the coefficient of performance. In addition to the heat thus transferred, there is added the mechanical equivalent of the power employed in driving the compressor or heat pump. By this means it is possible to heat our homes electrically—actually pumping the heat from the low temperature level outdoors to the higher temperature level indoors, with a current consumption that may make the process feasible where electric power is cheap but fuel is expensive.

The same process already is available under similar conditions in the evaporation of liquids. By utilizing the water-vapor from its evaporating liquid and compressing it with the centrifugal compressor to a slightly higher pressure and temperature on the heating side, it is possible to carry on the evaporation with a very small percentage of electric energy, compared to the work of evaporation. This is entirely feasible for evaporation processes where fuel cost is high. This is probably one of the developments that will come naturally with the rising cost of fuel as the available supply is reduced.—From a paper "The Thermal Engineer," by Willis H. Carrier.

Fig. 1. Blower Used in Connection with Kewanee Boiler in a New York Apartment Building

# *Saving on the* COAL BILL *by Using* SMALL SIZE COAL

*By C. F. Smith*

*L. J. Wing Mfg. Company*

WHILE salesmen for fluid-fuel-burning equipment are selling their devices by an appeal to the home-owner's desire for comfort, cleanliness and convenience, those interested in the burning of coal in heating plants have developed units which make one of the most powerful arguments possible—an appeal to the pocketbook.

The practice of equipping heating boilers with forced-draft devices, in order to burn buckwheat coal and the smaller sizes of anthracite, has increased remarkably during the past few years.

Buckwheat sizes and screenings constitute about 35% of the total anthracite production. Heretofore these small sizes were practically a drug on the market, especially screenings, which could frequently be had for the cost of cartage.

The development and application of forced-draft equipment to burn small anthracite in heating boilers has opened a big market for the disposal of buckwheat and screenings.

In some few heating plants having ample, well-designed, and high chimneys, buckwheat can be burned with natural draft. In practically all cases, however, forced draft is needed for complete and efficient combustion of small anthracite. This is due to the fact that the small grades of coal tend to pack down rather densely on the grates. Resistance to gas flow through the fuel bed therefore is increased, and some means of supplementing the chimney draft must be provided.

A blower does this work. It relieves the chimney of part of its burden; that is, it forces air through the grates and firebed. Thus the chimney is called upon only to expel the combustion gases to the atmosphere.

When it was demonstrated to the public that efficient forced-draft apparatus would solve the

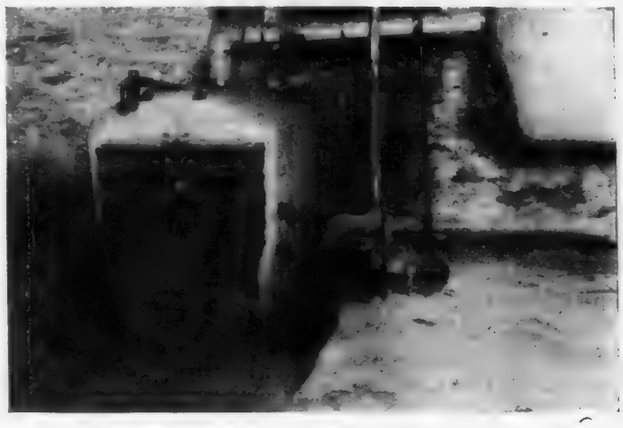


Fig. 2. Hot Water Supply Boiler in Brooklyn Apartment Equipped to Burn Small Sizes of Anthracite

**Fig. 3. A Pennsylvania Home-Owner Installed His Own Blower. Rheostat for Controlling Motor Speed Shown at Upper Right**

combustion problem of burning small anthracite, a big market at once was created for the sale of forced-draft equipment, as well as for the fuel itself.

Owners of apartment houses, stores and garages, school boards, and other fairly large buyers of coal readily found, by the aid of a little arithmetic, how much their coal bills could be reduced.

Savings in fuel consumption in the larger buildings are possible to the extent of 40%. The cost per ton of the fuel burned, after the installation of blowers, usually is about one-half that of nut or egg sizes.

In some cases a somewhat greater tonnage of small coal is needed than was necessary when burning the larger sizes. Most cases, however, require the same amount so far as tonnage is concerned. Although the greatest savings are necessarily found in the larger installations, proportionate savings are possible in domestic plants.

The cost of electricity for the blower motor averages 15c to 20c per ton of coal, and sometimes less —an almost negligible item of expense. A forced-draft installation often will more than save its initial cost during the first year; in other words, it is an investment yielding over 100% return. Naturally such economy appeals to every coal buyer, for in many cases the coal cost is the major item in building maintenance and operation. Reduction in fuel bills means more return from property, more net income.

In addition to the economy of burning small anthracite there are other advantages in its use. The boiler equipped with forced-draft blower can increase the steam output of the boiler, so that on severely cold days more steam can be supplied to the heating system. Furthermore, forced draft makes it possible to generate steam quickly, so that the frequent and uncomfortable cold spell in the morning will not be felt, or, fires can be started later, and yet have the building completely heated on time.

Automatic control operates to turn the forced draft blower motors on or off in order to maintain a constant steam pressure or room temperature. In addition, the point at which the blowers are turned on and off automatically can be changed by simple adjustment to suit the particular weather conditions.

Variable speed control of the blower motor by means of a hand rheostat is important, since it makes it possible easily to regulate the blower speed, and, consequently, the volume of air delivered to the firebed.

Applications of such installations are not confined to large plants, but can be adapted to the average sized home. For instance, the boiler shown in Fig. 3 is installed in a home in central Pennsylvania having 300 sq. ft. of water radiation. The owner of this home made patterns for special grates having smaller spaces between the teeth, so that the fine coal would not drop through. Grates cost $7, and the blower and thermostat $37. In small

**Fig. 4. Apartment House Installation with the Forced Draft Duct at the Rear of the Boiler**

domestic jobs, however, it is rarely necessary to change grates. If a little care is used in firing buckwheat, the old grates can still be employed. It is only necessary to keep a shallow layer of ashes, an inch or two in thickness on the grates. This will prevent any unburned coal from falling into the ash-pit. In this case the owner did the installing himself and connected the blower to the ash-pit by cutting a hole in the side. No arrangement of baffles was necessary.

Before installing the blower, 8 tons of stove coal at $10 per ton (coal being sold at low rates in this locality due to it being adjacent to the anthracite fields) was used annually. After putting in the blower and special grates, the consumption was 10 tons of a mixture of barley and rice coal which sells there for $3 per ton. The annual fuel cost, neglecting the increased electric bill, consequently amounted to $30 against $80 in previous winters —a reduction of 62½%. The one disadvantage of this system, the owner claims, is that dust gets in the bearings of the blower, and he has found it necessary to have ball bearings installed in the blower after the first season. Since that time, however, the system has worked satisfactorily.

There are blowers on the market having fully-enclosed and dust-proof motors which completely protect bearings, windings and commutators from the harmful action from dirt and dust. Many of these blowers have been in service for about ten years without trouble of any kind.

An installation in a six-family apartment house in the same vicinity is shown in Fig. 6. The owner of this building also had special grates cast, the cost being $20. This building has 1300 sq. ft. of radiation, and the fuel consumption now is 35 tons of mixed barley and rice anthracite at $3 per ton, against 28 tons of $10 stove coal before. The cost of power for the blower motors per season was $25.92. The annual fuel costs, since installing blowers, are $130.92 against $280 before. It will be noted that two blowers are used in this installation; the one is used for normal heat demand, and the other only for peak loads, such as in the early morning. The motors on these blowers are 1/6 H.P. This owner was put to some expense last season for a new blower, due to coal and ash dust getting into the bearings, but with the savings in fuel obtained, the owner stated that he could afford to buy new blowers every year and still be ahead of the game. A little care in the selection of the blower, would result in the owner securing a blower adapted to this work.

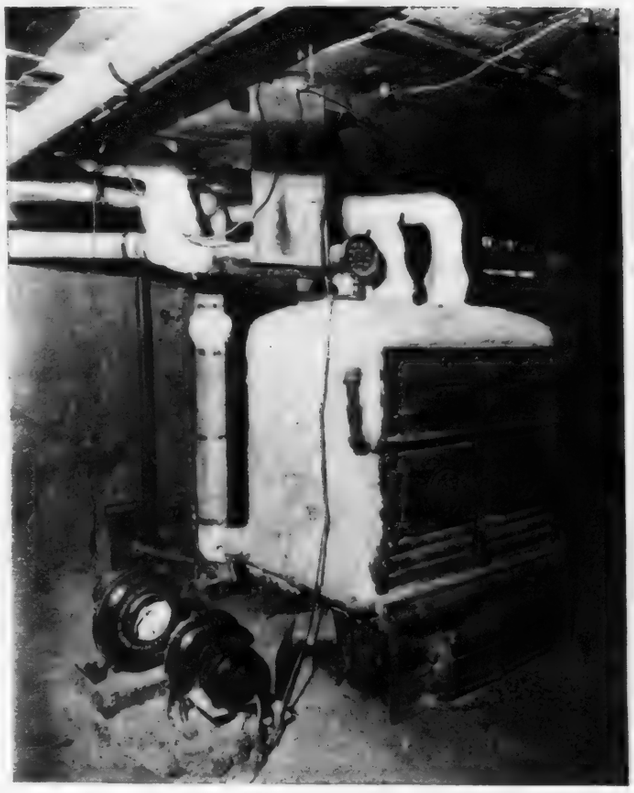


**Fig. 6. Two Blowers Are Used in This Installation, Both Being in Service Only at Peak Loads**

**Fig. 5. Forced Draft Used with a Magazine Feed Boiler**

The thermostats used in these two installations are simple affairs consisting of a strip of thermostatic metal mounted between two terminals. They have proven satisfactory, and have been in use for six years.

The company manufacturing the apparatus shown in Fig. 8 requires the use of a specially designed grate, most of the installations being in larger buildings. It consists of a direct-connected electric-driven draft unit designed to maintain an air pressure from 0 to 3 oz. in the ash-pit. The fan motor, which is fully enclosed, is mounted directly on the shaft of the blower; it has wide bear-

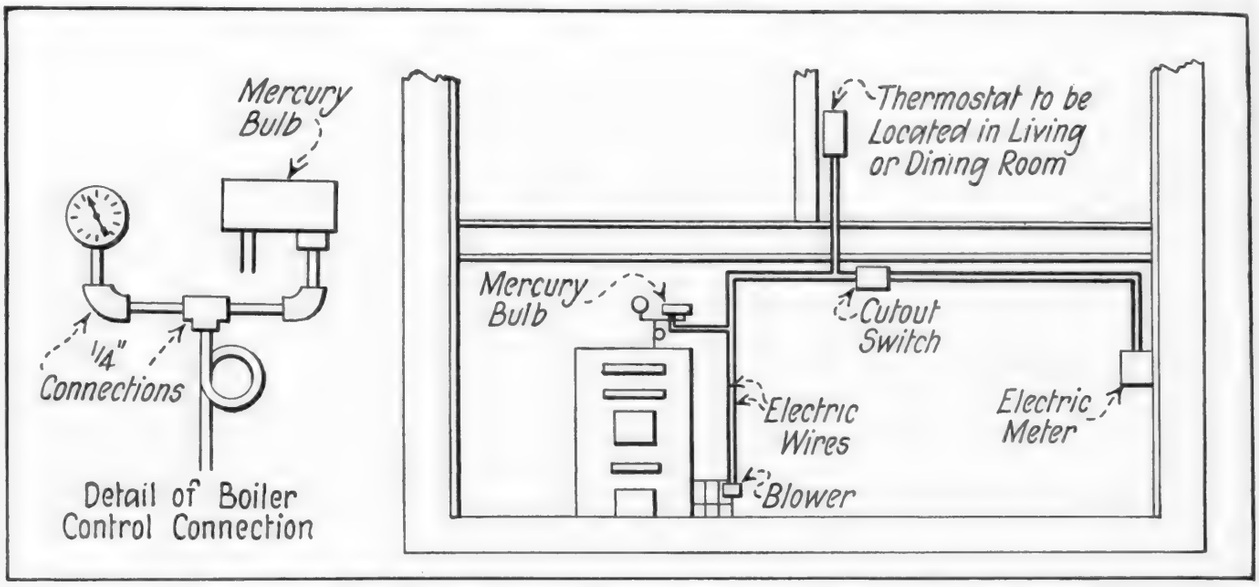



**Fig. 7. Diagram Showing the Electrical Connections Used on an Ordinary Blower Installation**

ing surfaces and oil reservoirs so as to require no adjustment after long periods of use. A fire-brick bridge wall is set and keyed in at the rear of the boiler. The system of control consists of an automatic solenoid switch, controlling the motor, which in turn is operated by a thermostat opening and closing a low-voltage circuit through a transformer. On installations where a thermostat is not practical, the operation of the draft unit can be controlled either by the steam pressure or water temperature in the boiler.

A large number of these units is installed in the Middle Atlantic States. In the installation shown in Fig. 8 there has been considerable saving since the blower was used. During the season 1926-27 the fuel costs were $4500 against a total of $2200 for the year 1927-28.

To indicate what can be done in the way of cutting coal costs in larger installations, it is interesting to examine the coal figures for a Long Island high school. This building has three floors, accommodating 1200 pupils.

In 1924 a forced draft system was installed. During the heating season of 1924-5, the total cost for the buckwheat coal was about $1900. The aver-

(*Continued on Page* 77)

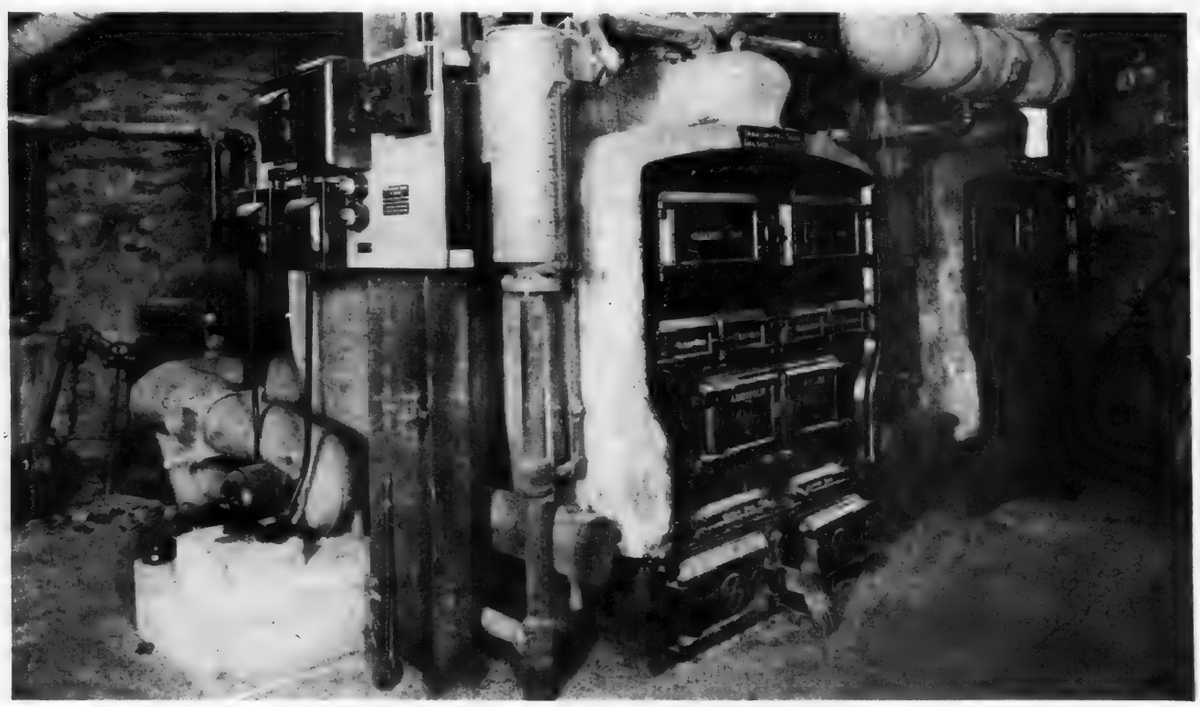


**Fig. 8. Small Blower Supplying Two Boilers with Forced Draft. Note the Electrical Controls on the Panel Board**

A Welded Steam Header Over Boilers Showing Steel Flanges Welded to Pipe Sections, Entirely Eliminating Screwed Joints

# Welding Costs *for the Heating Contractor*

## Unit Prices Here Presented Are Based on Actual Heating Installation Cost Records

**By John H. Zink**

*Vice-President and General Manager, The Heat and Power Corp., Baltimore, Md.*

THE piping contractor interested in the adoption of oxy-acetylene welding undoubtedly has been able to procure from available sources sufficient general information to justify its use in all regards except one, namely, cost, which, while the most important factor, apparently is least discussed.

It is true that detailed costs of particular welded installations have been published, but in nearly every instance these figures refer to field operations of long pipe lines which, to me, do not seem at all comparable to the kind of welding work we piping contractors must do. These long pipe-line installations present the opportunity for high speed, due, in many instances, to the pipe being of light weight, to similarity of the welds, accessibility, and to practically no over-lapping of labor charges. Our work, in general, is in quite restricted areas, much of it at varying distances above the ground, and requires more cutting, and the making of many kinds of angles and intersections. We therefore must recognize that our average welding work is more diversified and accompanied by higher costs of both labor and materials.

In presenting the following details of costs, it must be understood that they are representative of our actual experience here in Baltimore, over a period of five years, and are given as a helpful suggestion, or first aid, to those contractors who are uncertain as to their own costs, and desire comparative data and an insight into the methods used by others in determining costs.

My figures are based on the "V" type weld as I do not approve or use the butt-weld except where necessity demands. Also it should be stated that I consider a typical and proper welding job to be one including:

(1) Welding all pipe ends with "V" type welds.

(2) Socket or angle welds in lieu of fittings wherever possible.
(3) Welding forged-steel flanges to piping instead of using threaded cast-iron flanges.
(4) Guaranteeing all welds without question.

This eliminates, so far as is possible, the use of threads, and is the main purpose for which welding is intended.

Since welding presents three distinctive operations in our work, each requiring different material and labor quantities, it is necessary to determine each cost separately, and in order to arrive at fair averages, I have based my figures on typical installations requiring continuous welding operations extending over three to six weeks. On installations requiring less time these costs are somewhat higher, and on special jobbing work requiring a minimum number of welds they are very materially increased, as will be pointed out later on.

Unit costs used in this table are:

Oxygen.....$1.50 per 100 cu. ft.
Acetylene.....$3.00 per 100 cu. ft.
Welding Rod.....$0.18 per lb.
Labor, welder.....$1.00 per hr.

The quantities used are based on a welder using one cylinder of 200 cu. ft. of acetylene and one cylinder of 220 cu. ft. of oxygen every 8 hrs., which we have found to be a fair average.

It also will be noted that the average cost per weld is somewhat higher than the combined total of labor, acetylene, oxygen and welding rod for each weld. This allowance is made to compensate in part for lost time in changing location of the welder and for the acetylene and oxygen remaining in cylinders through condensation and reduced pressure.

Also it should be understood that these figures cover actual welding costs only, and any additional

TABULATION OF WELDING COSTS FOR STANDARD WEIGHT STEEL PIPE

| Standard-Weight Pipe Size, In. | Average No. of Welds, 8 Hours | Acetylene Per Weld, Cu. Ft. | Oxygen Per Weld, Cu. Ft. | Welding Rod Per Weld, Lbs. | Labor Cost Per Weld | Acetylene Cost Per Weld | Oxygen Cost Per Weld | Welding Rod Cost Per Weld | Average Total Cost Per Weld |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 45 | 4 1/2 | 5 | 1/3 | $ .18 | $ .13 | $.08 | $.06 | $ .45 |
| 1 1/4 | 42 | 5 | 5 1/4 | 2/5 | .19 | .15 | .08 | .06 | .50 |
| 1 1/2 | 38 | 5 1/3 | 6 | 2/5 | .21 | .16 | .09 | .07 | .55 |
| 2 | 32 | 6 | 6 2/3 | 1/2 | .25 | .19 | .10 | .09 | .65 |
| 2 1/2 | 30 | 6 2/3 | 7 1/3 | 1/2 | .27 | .20 | .11 | .09 | .70 |
| 3 | 27 | 7 1/3 | 8 | 3/5 | .30 | .23 | .12 | .10 | .75 |
| 4 | 24 | 8 1/3 | 9 | 3/4 | .33 | .25 | .14 | .12 | .85 |
| 5 | 20 | 10 | 11 | 7/8 | .40 | .30 | .17 | .14 | 1.00 |
| 6 | 16 | 12 1/2 | 14 | 1 | .50 | .38 | .21 | .17 | 1.30 |
| 8 | 10 | 20 | 22 | 1 1/2 | .80 | .60 | .33 | .27 | 2.00 |
| 10 | 8 | 25 | 27 1/2 | 1 3/4 | 1.00 | .75 | .42 | .34 | 2.50 |
| 12 | 6 | 33 1/3 | 36 2/3 | 2 1/2 | 1.35 | 1.00 | .55 | .45 | 3.35 |

**When a Welded Main Is to Be Installed, It Is Hung and Lined Up by the Mechanics So That the Welder Can Work without Interference**

**Piping Contractors Must Not Base Welding Costs on Unit Figures Taken from a Job Like This—a Long Oil Pipe-Line—as Such Figures, Covering a Large Number of Exactly Similar Welds and Comparatively Few Fittings, Would Be Far Below Those Obtaining in an Industrial Heating Installation**

labor required to assist the welder on a particular job must be added. We have found this necessary in practically every instance, and since this helper costs us $0.90 per hr., and it is also necessary for us to do a certain amount of cutting, "swedging" for reduction in pipe sizes, and since allowances must be made for overhead work, and repairs and renewals, all of which reduce the number of welds to be made per 8 hrs., with resultant higher costs, we arbitrarily have added 50% to the *average cost per weld in the above table* as our base cost. At first glance this may appear high, but careful analysis has proven that it just about covers all contingencies, and enables us to compete satisfactorily with the flanged and screw-fitting installation.

### Unit Costs to Be Used When Job Requires Welder Only

The logical deduction from these figures is that the average total cost per weld, in the above table, should be used where the welding operation requires the services of the welder only, but where additional help is necessary and job conditions as above mentioned are in evidence, some part or all of the 50% must be added as a base cost, allowing local conditions to determine what this percentage should be.

Admittedly it is a difficult problem to work out a satisfactory cost on the basis of the number of welds per day or per hour, because our work is performed in the field, the pipe being welded in position rather than being brought to the bench. Also there is a wide variation in the amount of cutting and welding on each installation. Therefore I have taken an 8-hr. average in the above table, and familiarity with any job in question should enable a contractor, as it does us, to determine to what extent he will be permitted to increase or decrease the number of welds per 8-hr. day.

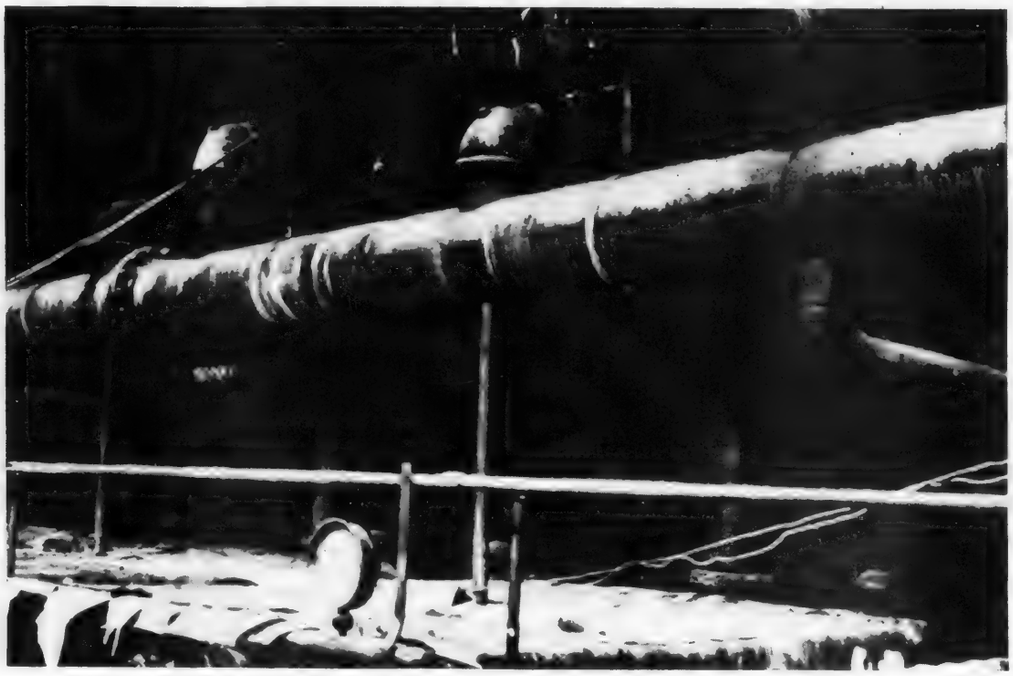
In welding angles, or intersections to take the place of fittings (reducing tees, ells, etc.), we add 100% to the average cost in the above table. This cost is based on one cut and one weld, and the use of standard templates to facilitate squaring or alignment. It is possible to reduce this cost if work can be planned to make up these fittings in the shop, but my figures are based on all of them being made in the field.

### Present Steel Flange Must Be Changed in Design to Meet Welding Requirements

The cost of welding steel flanges to piping presents a rather complicated problem in that we have found that the present steel flange must be somewhat changed in design to meet the demand of our industry. The present practice is to purchase these flanges without threads and reamed to suit the outside diameter of the pipe. The hub end of this flange is beveled similar to the pipe. The flange is slipped over the pipe so that the pipe end is practically flush with the face of the flange and recessed for peening, or not, as required, or the pipe end is recessed about ¾ in. to permit an inside weld to be made. This latter is only required in exceptional cases and then only on high-pressure installations. The general practice is to make only one weld between the beveled hub end of the flange and the outside wall of the pipe, with proper care being taken for the alignment of bolt holes. It also is possible to purchase welded nozzles about 1 ft. long with the flange already welded on so that it is only necessary to make a pipe weld in installing a flange connection. This is a special fitting offered at a cost we consider too high for the present in competition. It is my opinion, based on our own costs, that the fitting, alignment and welding of steel flanges aggregates the same average cost as does the welding of angles or intersections, in lieu of fittings, and for the same reasons, and we estimate accordingly.

After determining our welding costs in this manner they are set up in our estimate sheets as an item of cost to which the same overhead and profit is added as is to the other items of cost. Some variations occur, above and below our estimated figures, but they are no greater than the same variations in our estimated mechanics labor. Both present the element of "gamble" and the same care must be used in estimating one as the other.

We are called upon in many instances to name an hourly rate for the use of our welder plus all welding materials. We estimate our cost plus use of apparatus and depreciation at $3 per hr. to which we add 50% for overhead and profit, making our hourly charge to the customer $4.50 per hr.



**This So-Called Welding Job with Many Screwed Fittings Shows Lack of Appreciation of the Possibilities of Welding, and Points to the Desirability of Standardization**

This particularly refers to work on which we do not realize profit on any other material.

We also have been called upon to furnish our welders for dismantling piping where no welding and only cutting was required. Continuous cutting will average about one-half cylinder of acetylene and two cylinders of oxygen per 8 hrs., so that no change need be made in the hourly rate.

A mistaken idea seems to exist with reference to cutting and welding wrought-iron pipe. Statements have been brought to my attention that wrought iron is difficult to cut and weld, and consequently more expensive. This is incorrect in both instances. Wrought-iron pipe is just as readily cut and welded as steel pipe and at the same cost.

The cost of welding extra-heavy pipe, angles, intersections and flanges is more than where standard-weight pipe is used, and we have proportioned these charges, in each case, for estimating purposes as follows:

Extra-heavy pipe sizes 1 in. to 3 in., add 15% to standard-pipe costs.
Extra-heavy pipe sizes 4 in. to 6 in., add 25% to standard-pipe costs.
Extra-heavy pipe sizes 8 in. to 12 in., add 50% to standard-pipe costs.

Many times I have been asked if it is feasible to weld ½-in., ¾-in. and 1-in. pipe. My answer is in the affirmative, without question. We have been welding these sizes, both standard and extra-heavy, for the past five years for high pressures, without difficulty and with no resulting trouble. My table of costs does not include these sizes because they are seldom required to be welded in the average heating installation. Costs for welding these sizes are in direct proportion, and are easily determined.

A natural question now arises as to whether the figures presented substantiate my contention that a typical welded installation, as above described, may be placed in competition with the screw-and-flanged fitting-installation at no additional cost to the owner or piping contractor. Our experience has proven this in a mutually satisfactory manner. In our efforts to sell a welding installation the first question we usually are asked is: *"Is Welding Cheaper?"* Until the trade, in general, is better acquainted with the merits of welding, we must be prepared to answer this question intelligently. Our answer is in the negative, and we sell welding because it is *better at the same cost* and this fact, properly presented, requires no claim to "cheapness" in having it accepted by the owner and consulting engineer.

It must not be inferred that, in our experience, the costs of particular jobs have not been higher for welding. They have been, especially on high-pressure installations, but we knew it in advance, and an intelligent presentation of the reasons invariably has enabled us to obtain the higher price without controversy. It is better to settle this question before beginning a job than after, and it is our responsibility, which we readily accept, to know these costs in advance within reasonable limits of accuracy.

I have a very decided opinion that we must establish uniform welding practice in our industry if we are to have any control of our costs, and I believe publication of details of welding practice and methods of ascertaining costs in different localities, will be invaluable in quickly bringing about standardization.

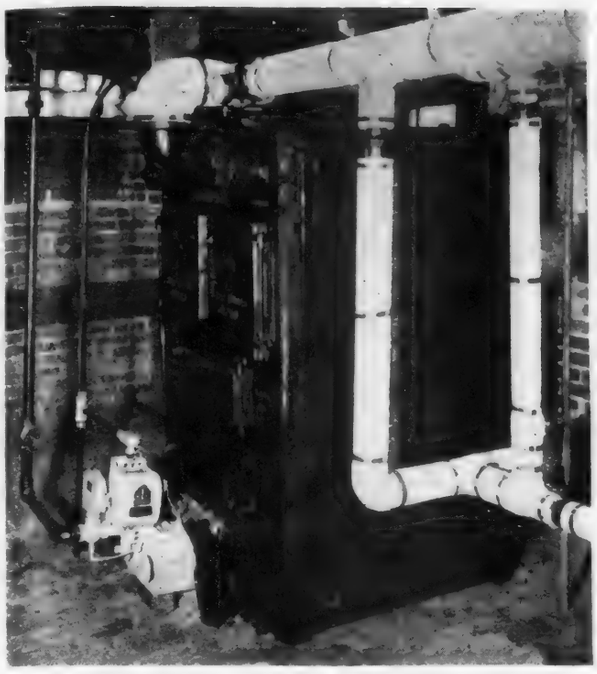


Fig. 1. An Attractive Conversion Installation in a Jacketed Boiler

# Burning Gas in Coal Boilers

## *Part II—Discussion of Fixed Charges on Gas-Fired Equipment, and Descriptions of Conversions and Economizers*

**By Clifford Strock**

*Assistant Editor, The Heating and Ventilating Magazine*

A SPEAKER at the recent convention of the American Gas Association brought out that, in some cases, a home-owner would be better off if he bought a conversion unit than if he purchased a gas-designed heater. The reason advanced was that the fixed charges, which would be smaller in the case of the conversion, due to its lower cost, might overbalance the higher fuel consumption in the converted heater. The speaker reported that he had used in his calculations an efficiency of 73% for conversion equipment, and 79% for the standard boilers. For an overall *seasonal* efficiency both of these figures seem rather high, even for gas. However, using these efficiencies, it can be shown that the above statement is only true when one of the less costly conversions is used.

For example, assume a seasonal gas consumption of 500,000 cu. ft. by a standard gas boiler showing 79% efficiency and costing $1000. Then, for a conversion operating at 73% efficiency, the converted installation will require 540,000 cu. ft. With interest charges amounting to 6% for each job, and a depreciation of 10% on a $70 conversion (ten years is a reasonable life to allow for conversion equipment, as this seems to be good accounting practice in the oil-burner industry, conversions

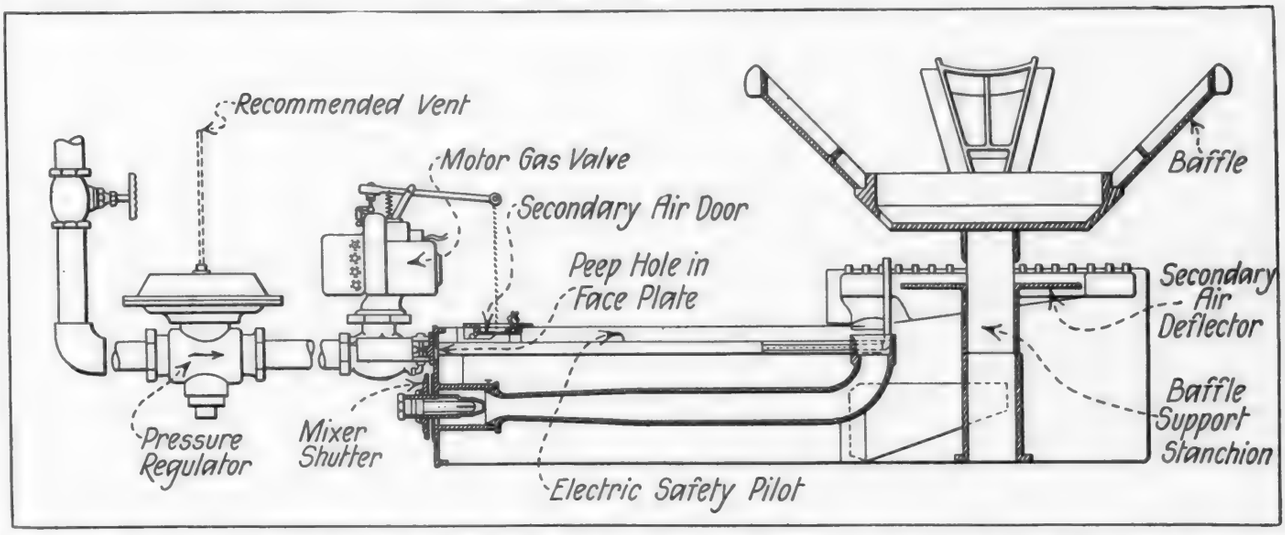



Fig. 2. Conversion Shown in Fig. 1 Is Equipped with Complete Set of Controls. Primary and Secondary Air Can Be Closely Adjusted

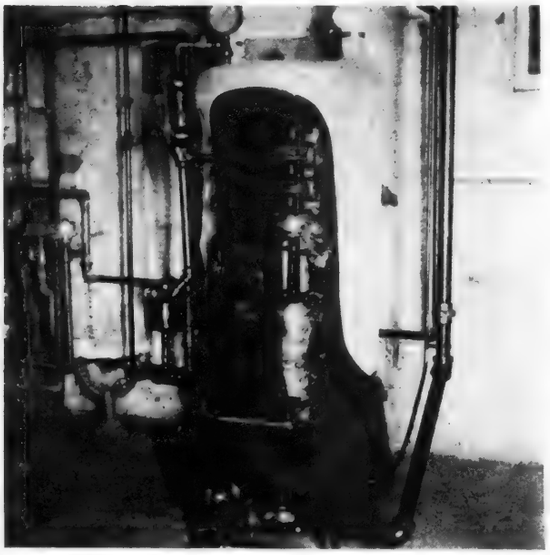


Fig. 3. An Installation of the Burner Shown in Fig. 4

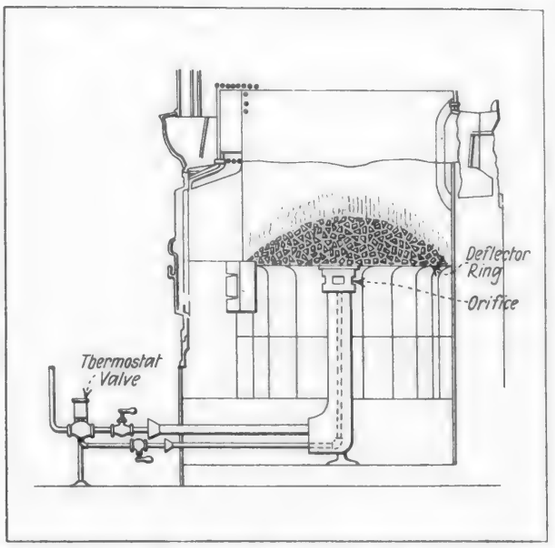



Fig. 4. Radiant Material Piled on Iron Plate Resembles Bed of Anthracite When Gas Is Burning

being similar to oil-burners), and allowing a depreciation of 6% on the regular gas boiler, the total yearly cost for the conversion, using 80-cent gas, will be $443.20, while the yearly cost for the gas-designed equipment will be $510.

There is another angle to such a question, however, and this is that some of the conversions (those belonging to our second class) are comparatively expensive. If we use the same method of computation for a $500 conversion unit, and use the same efficiency, depreciation, and interest figures as for the less expensive converted job, the total yearly cost amounts to $512, which is practically the same as that of the gas-designed equipment.

The use of such figures can arouse a storm of protest from manufacturers of both types of equipment. Those making regular gas-designed heaters will claim that their efficiencies are much higher than those stated, and that the difference between the efficiency of their product and that of the conversion manufacturer is much greater than 6%. Conversion manufacturers will, on the other hand, claim to have efficiencies equal to—and some claim higher than—those obtained from the standard heaters. The depreciation figures also would be questioned; any question involving the comparative life of two competing types of merchandise invariably starts a dispute. Gas-fired boilers or furnaces, either standard or converted, as they are being sold today, have not been on the market long enough to make any positive statement as to their average life.

Close control of the secondary air supply is possible with the unit shown in Fig. 2. The secondary air door, which is controlled by the main motor valve, allows the secondary air to enter the duct surrounding the Venturi tube. A secondary air shield fits around the circumference of the burner, forcing the air to pass in close contact with the flame. The large baffles are for the purpose of forcing the flames against the sides of the heater. An electric safety pilot is an integral part of this apparatus.

There is a large number of these burners in use throughout the country. Data have been collected in a systematic way, and instructions for making a survey for the installation of this equipment are complete for all of the models. The units are made in two types, one for round boilers and furnaces, and one for square or rectangular installations, there being three sizes of each type. For manufactured gas, the capacity of these units ranges from 250 to 600 cu. ft. per hr.

Some interesting tests made on this burner by a gas company gave the results presented in the following table. The boiler was covered with 2 in. of 85% magnesia. Test No. 1 was a full time test, while No. 2 and No. 3 were run with the burner on 30 min. and off 60 min. The last two were run over two complete cycles.

| Test No. | 1 | 2 | 3 |
|---|---|---|---|
| Flue gas temperature, degrees F. | 350 | 345 | 343 |
| $CO_2$ in flue gas, per cent | 12.4 | 12.3 | 12.3 |
| B.T.U. of gas per cu. ft. | 546 | 544 | 544 |
| Consumption, cu. ft. | 335.6 | 334 | 334 |
| Excess air, per cent | 13.2 | 7.8 | 6.2 |
| Thermal efficiency, per cent | 77.2 | 73.1 | 72.7 |
| Flue loss, per cent | 14.4 | 14.5 | 14.5 |

### Length of Time Required for Installing—an Important Factor in Gas Conversion Design

The unit shown in Figs. 3 and 4 is equipped with one burner head for both a high and low capacity burner. The low capacity, or constant burner, is intended to operate continuously throughout the heating season and acts as a pilot for the high capacity head which carries the heavy and peak loads. This tends to make the unit flexible and easy to adjust to individual boilers. Atmospheric burners are used, with the primary air adjustment on the outside of the boiler. Secondary air supply is adjusted by means of varying the chimney draft. The gas burns at the orifices in the sides of the tube (see

Fig. 4) and is deflected horizontally by a heavy cast-iron plate, on top of which is a bed of radiant material which acts as a reservoir for the heat input and gives off surplus heat during low demand periods.

Installation of this burner requires but an hour, and all the piping connections and wiring can be completed in half a day. The vertical head is supplied in different sizes, depending on the height of the crown sheet. Available in seven sizes, this unit can be supplied in three different types, vertical, horizontal, and with extended mixing tubes for warm-air furnaces. Round or sectional boilers or warm-air furnaces can be fitted, the capacities ranging from 150 sq. ft. to 2500 sq. ft. of equivalent steam radiation. The company manufacturing this unit prefers to make estimates of gas consumption on the basis of the coal previously used rather than on the basis of a unit gas consumption figure.

Invented by the chief engineer of a large eastern gas company, the conversion illustrated in Fig. 5 is rather unusual in its application to the heater. In making the installation no change is made in the boiler. The grate is left in and ½ in. of asbestos is plastered down over the grate and around the sides. The joint between the asbestos and the boiler is made tight with furnace cement, and 1 in. of sand is placed over the asbestos to hold it down. The ashpit door is tightly sealed and the firedoor opening is bricked up with a cast-iron sleeve inserted. The burner is bolted to the sleeve, and the space between this end of the burner and the flange of the sleeve controls the amount of secondary air. This unit is equipped with a thermostatic pilot (in Fig. 5 the pilot connection is not shown), a gas pressure regulator, a Robertshaw temperature limiting device, a solenoid valve, and a special room thermostat. The manufacturer of this unit claims that the air can be controlled to such a degree that less than 1% excess oxygen is needed to keep the CO in the flue gas below the allowable amount.

Some operation figures on this unit taken from installations in Central New England, are:

| Sq. Ft. Radiation Installed | Sq. Ft. Radiation Theoretical | Cu. Ft. Gas per Sq. Ft. Actual Radiation per Degree-Day |
|---|---|---|
| **STEAM** | | |
| 297 | 308 | 0.197 |
| 325 | 308 | 0.198 |
| 300 | 360 | 0.213 |
| 216 | 304 | 0.196 |
| **WATER** | | |
| 245 | 239 | 0.113 |
| 270 | 282 | 0.137 |
| 487 | 509 | 0.113 |
| 599 | — | 0.120 |
| 433 | 504 | 0.129 |

The company which makes the burner shown in Fig. 7, states that this unit should be installed in such a way that the tips of the burners project

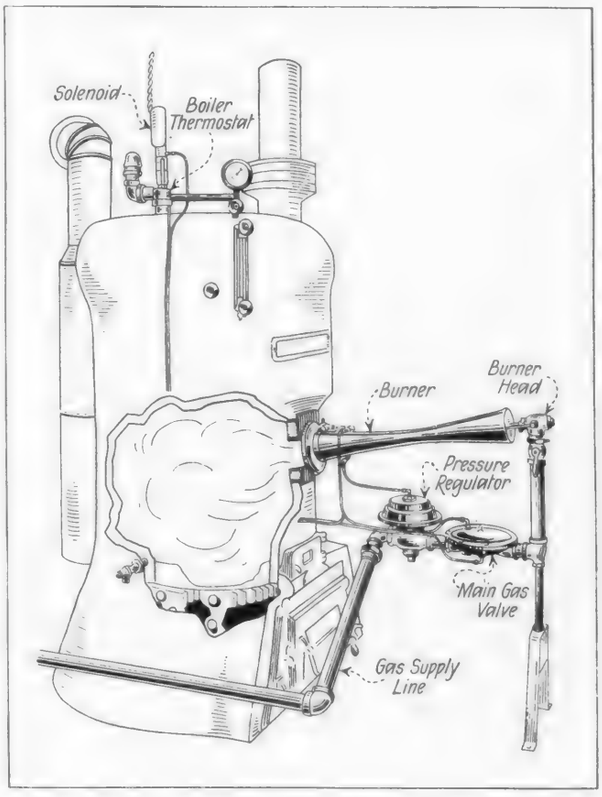



Fig. 5. Gas Is Admitted Through the Fire-Door with This Unit, an Installation of Which Is Also Shown in Fig. 6

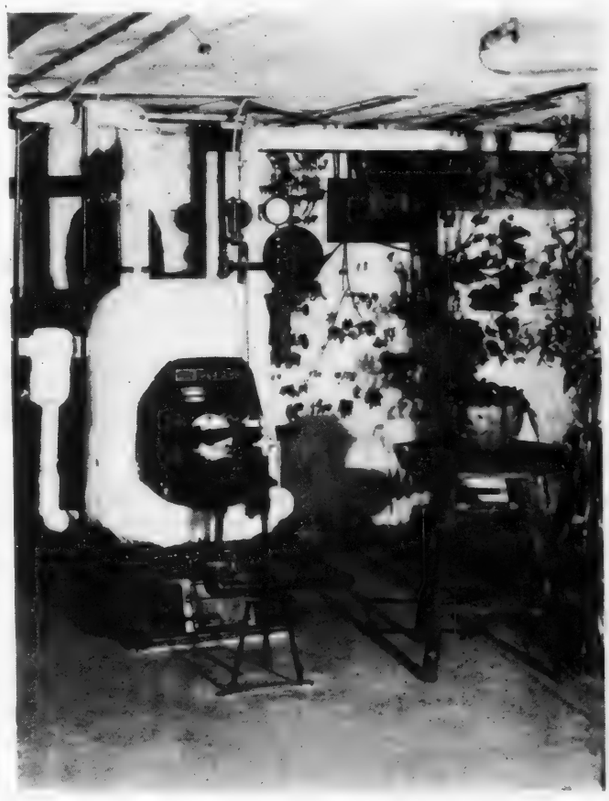


Fig. 6. A Modern Basement Decorated for Halloween. The Basement Can Be Kept in This Condition When Burning Gas

through a lining of asbestos board, as shown in the drawing. Primary air is admitted at the base of the mixing chambers, and the purpose of the asbestos board is to prevent the gas from becoming preheated. This type burner is used in large sectional boilers, and the arrangement of units is made to conform to the firebox. The same manufacturer makes a burner for smaller round boilers and furnaces which is installed in the feed door of the heater, the tip of the burner being pointed downward to force the flames to travel down to the bottom of the firepot. This type burner is made in eight sizes, and has the advantage that it can be removed in a very short time and swung up out of the way. In natural-gas districts this is a marked advantage, especially in those localities where the unit gas cost increases with the consumption.

A unit which uses a forced air supply and very small orifices is shown in Fig. 8. The burner is supported by the furnace grate bars, and a sheet of asbestos board is used as a foundation for the burner frame. The air and gas mixture is forced by a blower through small orifices in half-inch nipples. A preheater is used, thus utilizing the heat in the flue gases to heat the gas and air supply. The gas burns around radiant elements, converting a comparatively large proportion of the heat energy into radiant heat. Air leakage through the firebox is prevented, as far as possible. Equipment which is supplied with this unit includes thermostatic control, safety valve to shut off the gas if the fan stops, pressure regulator, and an emergency valve in the gas supply line. This unit is available in three sizes; these fit fireboxes of 18 in., 20 in., and 22 in. in diameter.

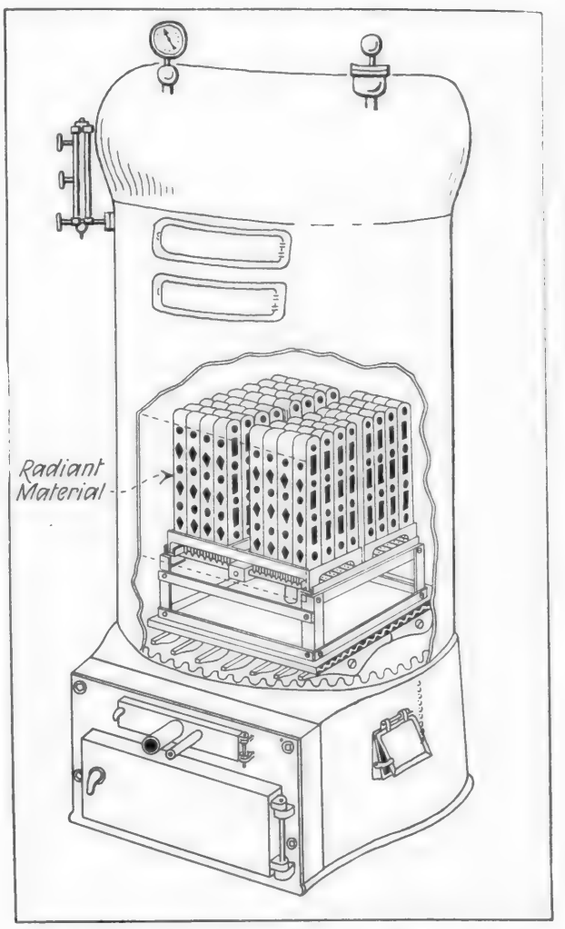



**Fig. 8. An Important Feature of This Unit Is the Radiant Material**

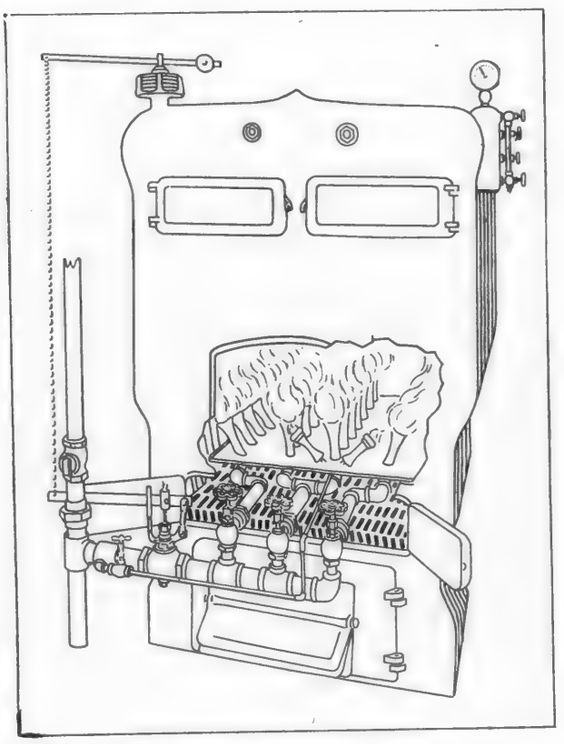


**Fig. 7. Asbestos Board Laid Over the Grates Keeps Heat in Firebox**

The burner shown in Figs. 9 and 10 is another of those developed in the natural-gas territory. It will be seen that a special brick deflector is used to cause the flame to impinge on the sides of the furnace or boiler walls and to form a dead air space in the center of the furnace. The gas issues from orifices in the main supply pipe extending around the firepot and induces primary air before entering into the upright nipples. These nipples are not tightly attached to the supply pipe, but stand slightly above to allow the air to mix with the gas.

This unit can be adapted to any type of round or sectional boiler or to any warm-air furnace excepting those tubular boilers and furnaces which have a brick lining or brick firebox. Down-draft double-grate cast-iron boilers also are not adapted to this burner. Circular burners for round boilers and furnaces can be supplied in eleven sizes to fit firepots from 14 in. to 38 in. in diameter. Units for sectional boilers are made up to fit the particular boiler in which it is to be installed.

Another type of unit developed and used in the natural-gas territories is one in which the burners are supplied with three control valves, each modulating the gas passing through the side walls of the mixing chambers. All of these openings are drilled at an angle to the longitudinal axis of the burner,

and tangentially to the wall of the mixing chamber. This is done for the purpose of imparting a spiral motion to the column of air passing into the mixing chamber. The gas pressure at which this burner is most effective is between 6 and 8 oz., but it can be used as low as 1 oz.

In a natural-gas territory operated for a long time, and from which gas must be pumped from sources constantly more remote from the place of consumption, extremely low pressures often prevail during prolonged cold spells. For this reason, burners must be so designed that they can operate on low pressures, and the manufacturer of the burner shown in Fig. 12 claims that this burner will do just that. This burner consists of a port or passageway admitting regulated quantities of air; of a reservoir arranged for admitting gas underneath this air, and of a long tapered chamber, rectangular in cross section, in which air and gas are mixed and carried to the tip where the mixture is burned. In order that it may operate at a pressure of one-half ounce, a draft from the chimney is required to pull the gas and air through the burner. Baffling usually is used with such burners to force the hot gases against the boiler sections and prevent too high flue losses. For baffling sectional boilers, the manufacturer of this unit recommends the building of two refractory walls on the grates built across the boiler in the middle of the firebox.

This burner, which is used only in natural-gas territories, can be installed singly or, by using a header, in a battery, giving a wide range of capacities. It is available in eight sizes, the smallest being of a size used in small homes, three units being used, for instance, to heat one floor of a duplex dwelling. A pair of the next larger size is used for the average sized home. The largest unit has a capacity of 22 H.P. and is used for small factories, large apartments and hotels.

### Economizers, If Constructed of Proper Material, May Prove Economical

Whether or not the use of economizers and preheaters pays in the end is a question which is difficult to answer. Undoubtedly the use of an economizer, such as is shown in Fig. 11, will result in lowering the heat lost in the flue gases. The life of such a device would be short in cases where corrosible metal was used if the flue gas temperature is dropped below the dew point, and if such equipment is elaborate, the fixed charges may overbalance the saving in gas. However, where low stack temperatures are known to be involved, suitable non-corrosible metals can be used for smoke pipe and economizer construction. One conversion manufacturer has said that a few years ago he found that he could obtain remarkable results so far as fuel economy was concerned, by using a preheater placed in the breeching, but that there was so much trouble with it after the first season that its use was abandoned.

One of the most recent developments in conversion equipment is a system of the power type. The manufacturer of this burner has adapted his unit to round boilers and furnaces, and will shortly have a unit ready for sectional boilers. The method of sealing the various sizes of ash pits without having any bricks or mortar is an interesting feature of this device. By referring to Fig. 14, it will be observed that the heads adjust radially on their respective surfaces. This allows the burner always

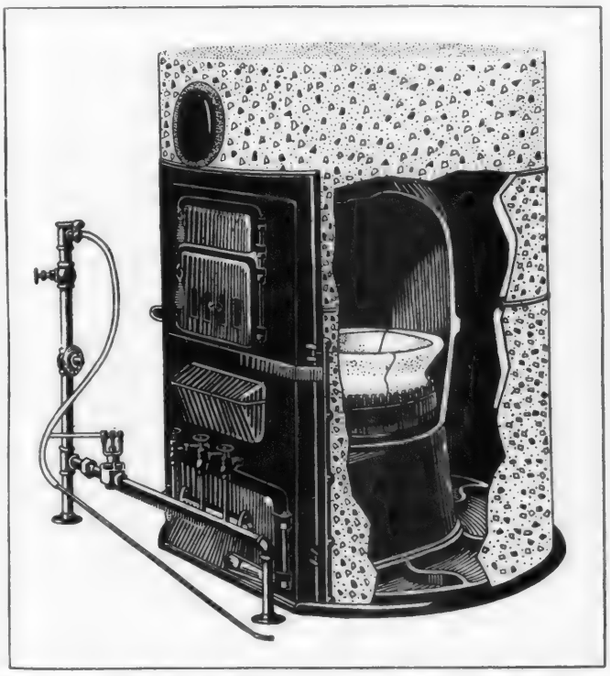


**Fig. 9. Application of Conversion to a Warm-Air Furnace. Refractory Deflector Forces the Flames Against the Sides**

**Fig. 10. Type of Burner Shown in Fig. 9 Used in Connection with a Large Cast-Iron Sectional Heating Boiler**

to fit the actual size of the fire-pot and to place the flame in the proper relation to the side walls of the heater. The mechanical construction of the burner is shown in Fig. 14, which will enable the reader to grasp the principle of application, as the section shows plainly the various passages through which the air and gas are conveyed to the mixing point F.

Both the gas and air are passed through measuring discs at a very low pressure, the air being supplied by a quiet fan at a pressure of 1¼ in. of water. The gas before entering the manifold is regulated and controlled by a low-pressure regulator which delivers gas to the manifold at a pressure of 1¾ in. of water. The gas passing through the tube E mixes with the air flowing through the measuring disc U to point F. From this point the mixture passes to the arm H at point G and continues on through the tapered arm H. From the arm H the mixture flows to the passage I and is burned at the outlet J. The curtain of "safety air" is introduced through a measuring disc into passageway K and from there flows to the outlet L.

### Curtain of "Safety Air" Used to Prevent Backfire

The curtain of "safety air" applied to L thickens the flame immediately about the outlet J and slows up the velocity to the rate of flame propagation, and thereby prevents the flame from lifting or blowing away. Thermostatic control cuts off the gas valve and the motor supplying the air at the same instant, but the momentum or drift of the motor supplies air through the arm H, which pushes out the gas and air mixture before the velocity from the outlet J has dropped to the point where it is slower than flame propagation. There is no noise when the flame goes out. On starting up the burner, the gas passes through before the air, and this prevents a drop back in the burner and minimizes the possibility of a flashback.

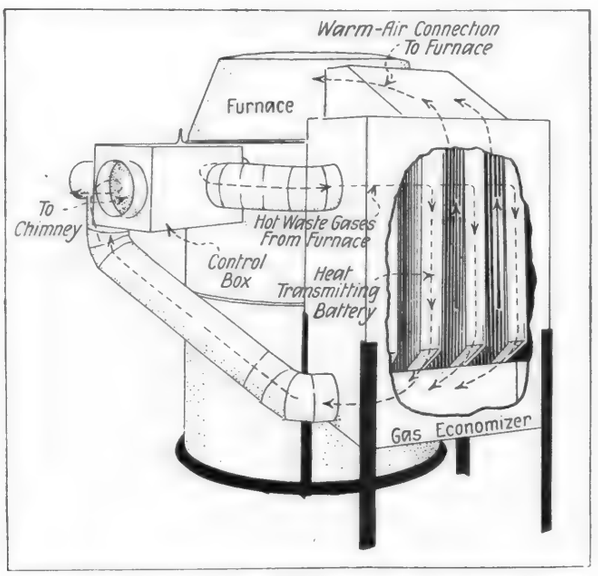



**Fig. 11. Economizer Designed for Use with Warm-Air Furnace Conversion Installations**

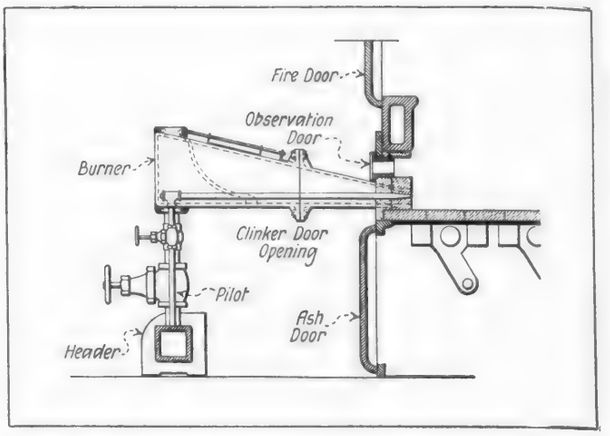



**Fig. 12. General Arrangement of Conversion Used in Natural-Gas Territory**

This system is furnished with thermostatic control of gas and air, automatic gas pilot, masterstat control for low water level and high pressure, and a disc control for volume set by the manufacturer.

The construction of this burner allows easy access through openings M, N, O, P, Q, R and C for setting the burner to handle the various kinds of gases found throughout the country. Surfaces are machined to insure gas-tight joints without the use of gaskets, and the leveling screws S and T permit installations to be set to the proper height. These burners are built and shipped assembled, with the exception of the distributing heads, which are placed in position through the fuel supply door.

### Conversion Designers, Following Original Ideas, Are Not Hampered by Convention

Having concluded these descriptions, the reader will have noted that there is little similarity among the various units. Some manufacturers hold that it is absolutely necessary to use radiant material to obtain proper results. Others claim that the use of refractory material will aid in obtaining good combustion. Still others see no reason why either is needed. Controls on most of the conversions are made by the leading manufacturers of such devices but several companies have developed their own controls in order that they may be especially adapted to their unit. While most of the units are not equipped with economizers or preheaters, there are those using such devices. Some designers have used blowers and fans to mix or force the gas through the burner; others feel this is a waste of electrical energy.

In other words, conversion designers are trying everything. While it is impossible to expect that success will crown the efforts of all of the manufacturers, it appears certain that some are on the right road. At least they are not in a rut; they are not held back by any hide-bound and ancient convictions. And this is a healthy state.

The report of the house-heating committee of the

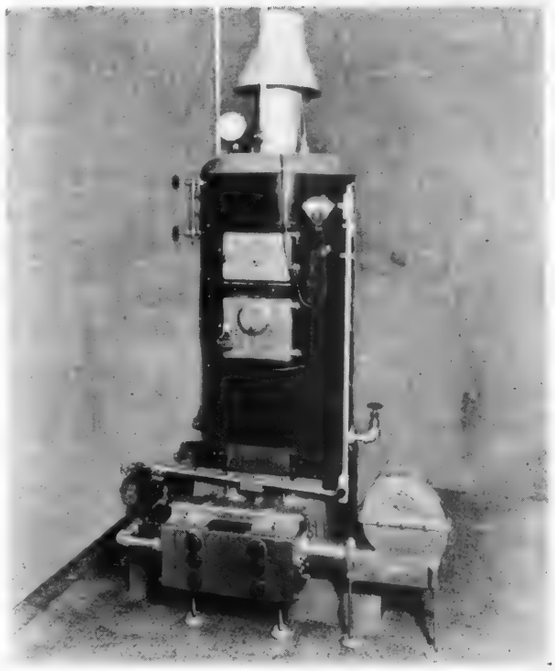


**Fig. 13. A Well-Designed Conversion in a Jacketed Round Boiler**

American Gas Association contains a list of the gas companies promoting the sale of house-heating. Although the list is not entirely complete, it is significant to note that the total number of converted installations reported up to 1928 is 24,738. This is indicative of the increasing popularity of the gas conversion, and apparently this equipment will be a potent influence in educating the consumer to the use of gas for house-heating.

## Saving on the Coal Bill by Using Small Size Coal

(*Continued from Page* 66)

age cost of the buckwheat was $6.20 a ton, whereas had stove or egg been burned instead of buckwheat, the cost would have been around $4,000.

After using buckwheat for the first year, the superintendent of the schools experimented with screenings, which he found he could buy for 50c a ton. The success he realized the first year, with a limited tonnage of screenings, initiated the program of using screenings exclusively.

Screenings are not always available in the immediate vicinity of this city, but are readily obtainable from coal dealers in the nearby towns at low cost.

In firing the screenings in this school, the coal is thoroughly wetted before being shoveled on the fires. This method of firing has worked out very successfully. On mild days a very low fire can be kept, and boilers may be banked for days at a time.

Data for this installation are as follows: Building, 264 ft. long, 162 ft. wide, 42 ft. high; 3 floors; volume—1,750,000 cu. ft.

The heating plant consists of three steel boilers equipped with forced draft. A vacuum heating system is installed.

| Year | Coal Used | Annual Tonnage | Total Cost | Nights Used with Bldg. heated |
|---|---|---|---|---|
| 1924-5 | Buckwheat | 307 | $1897 | 84 |
| 1925-6 | Buck. and Scr. | 387 | 1466 | 119 |
| 1926-7 | Screenings | 538 | 867 | 159 |
| 1927-8 | Screenings | 540 | 807 | 132* |

*During this year (1927-8) the building was heated 564 hrs. during evenings for school and community activities.

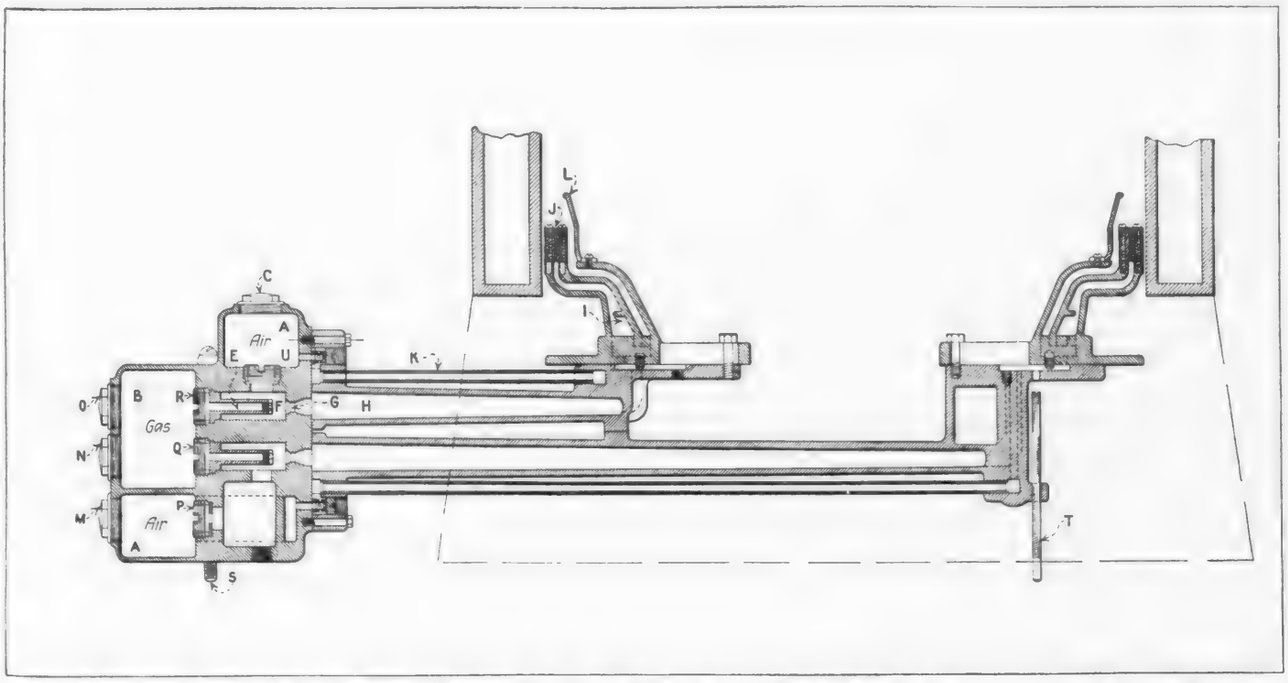



**Fig. 14. Section Through the Unit Shown in Fig. 13. The Method of Adjustment of the Burner Head May Easily Be Seen**

# The Heating & Ventilating Magazine

A MONTHLY JOURNAL OF ENGINEERING PROGRESS

*MEMBER*

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| | |
|---|---|
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| Back Numbers | 50 cents each |


IT has been a matter of wide comment that the advertising columns of THE HEATING AND VENTILATING MAGAZINE vie in interest with the text pages. For sheer attractiveness of display and engineering appeal, we make bold to say that in few other technical journals are manufacturers' announcements more effectively presented. We can say this freely because, as a rule, the credit for the design belongs to the advertiser, or, more often, to the advertising agent. We recall the naive, but tart, comment of one of our old-time readers, a well-known heating engineer and contractor, when questioned as to some feature of our editorial program: "To tell you the truth, about all I read regularly in your magazine are the advertisements. I glance through the reading pages, of course, but, more often than not, when I come across articles that interest me, I generally clip them for attention at my leisure. But your advertising pages are a treat to any man who expects to keep up to the times in the heating and ventilating field." A left-handed compliment, to be sure, but one easily understood after an inspection of the displays carried in any given issue. We once made the observation that where an industry is so comprehensively represented as it is in THE HEATING AND VENTILATING MAGAZINE, the advertisements constitute a veritable manufacturers' exposition—permanent, but kept up to the minute by constant changes of display.

WHEN it comes to the selling appeal in advertising copy some pertinent comments are made by F. M. Feiker, managing director and secretary of the Associated Business Papers, writing in *Printers Ink*, where he calls attention to the two methods an advertiser can adopt. The first, he points out, is the idea that he, in common with other advertisers in the field, is selling against other fields, and he cites the situation which arose in the refrigeration industry when the ice interests thought they had to combat the development of electrical refrigeration. It was not until both sides realized that they were selling refrigeration that they dropped their warfare on each other.

The second idea is that he is selling his own product in competition with other products in the same field. Under this heading Mr. Feiker gives some concrete instances of the effect of competitive advertising.

---

AS a practical basis for the guidance of both advertiser and publisher in the preparation and acceptance of advertising copy, Mr. Feiker proposes the following principles for discussion and acceptance by the advertiser, advertising agent, publisher and organized manufacturing and trade groups:

"1. That advertising copy which singles out individual competitors is unfair and unethical.

"2. That effective copy best expresses what the product, equipment or service is, rather than what a competitor's is not.

"3. That comparisons between the manufacturer's product and old methods or present general practice are sounder business building than comparisons with a single competitor's product.

"4. That statements of comparative efficiencies must be accompanied by proof and complete supporting data in the same advertising copy.

"5. That advertisements of patent infringement suits being started and advertisements of preliminary injunctions are not acceptable.

"An advertisement of a final decision is admissible, provided the facts are capable of substantiation, the wording subject to approval, and the court and circumstances of the decision clearly stated.

"A general notice that patent rights will be protected against infringement, as a general warning against the manufacture, sale or use of infringing appliances, is acceptable.

"6. That the buyer's belief in advertising statements is in the custody of the advertiser (or his agent) and the publisher, and both share the responsibility for fair play."

Needless to say, the principles here set forth have the unqualified endorsement of THE HEATING AND VENTILATING MAGAZINE, whose position on the subject is well known.

# Building Insulation—What It Costs and What It Saves

## A Comprehensive Report Dealing With Various Types of Construction in Widely Separated Localities

DATA on building insulation, covering a large number of installations, formed the major part of the report of the Insulation Committee of the General House Heating Committee of the American Gas Association, presented at the recent meeting of the association in Atlantic City, October 8-12.

Under the chairmanship of J. D. Preble, of the Public Service Company of Northern Illinois, the committee took up such points as the average cost of insulating an 8-room home, the saving in first cost of the gas boiler and radiation when different reductions of heat losses in the home are assumed; the saving in gross B.T.U. of gas effected by the insulation in various latitudes; the annual return on the insulation invested for various gas rates for latitudes; the average reduction in hourly heat demand that can be obtained in various latitudes, and, finally, the effect of double windows and the savings made possible through their use.

Particular interest attaches to the data on actual results secured through the application of insulation, due to the fact that in many cases these homes have been heated one or two seasons without insulation; then with insulation in the ceilings; bill transcripts demonstrate the results, which need no explanation. In other cases the estimate as given by the respective gas company, prior to heating the home, has been presented alongside the actual cost figures. There are some cases where nothing is presented but the actual cost of heating the insulated home. The first two classes illustrate just what can be expected of insulation and prove conclusively that the cost of heating the insulated home can be estimated just as accurately, if not more so, than the uninsulated home, by using proper calculation factors.

### I. Cost of Insulating an 8-Room Home

The committee, in making the subsequent calculations, took a hypothetical home 30 ft. by 30 ft., full two stories high, ceiling heights—8 ft. 6 in. (attic unfinished); 15% of the gross wall area to be glass or doors; construction to be 4 in. brick, with 4 in. hollow tile walls, finished with ½ in. plaster on top. This construction is assumed as about the average found throughout the country. To be sure, there are homes with more window area and there are homes with less window area.

To find: The thickness of insulation to give a B.T.U. reduction of 30%.

Assume: 15% of wall area is glass or doors.
1 air change per hour.
Weatherstripping.
Inside temperature—70°, outside—0°.

Gross wall area = (30 ft. + 30 ft. + 30 ft. + 30 ft.) × (8 ft. 6 in. + 8 ft. 6 in. + 12 in. + 12 in.) = 2280 sq. ft.
Windows and doors 15% = 342 sq. ft.
Net wall area = 1938 sq. ft.
Door area = 42 sq. ft.
∴ Window area = 300 sq. ft.
Cubical contents = 28 ft. 6 in. × 28 ft. 6 in. × 19 ft. 0 in. = 15,433.

to reduce the unit heat flow thus:

$$\frac{15,600}{1,938 \times 70^\circ} = 0.115 \text{ for walls}$$

$$\frac{5,208}{812 \times 70^\circ} = 0.092 \text{ for ceilings}$$

The thickness of insulation required to make the reductions shown will be dependent on the conductivity of the material to be used for insulation. A calculation of the thickness is best carried out by considering the thermal resistances of the construction concerned. The resistances follow:

| | | |
|---|---|---|
| Wall uninsulated | $\frac{1}{0.277}$ | = 3.61 |
| Wall insulated | $\frac{1}{0.115}$ | = 8.69 |
| | Difference = | 5.08 |
| Ceiling uninsulated | $\frac{1}{0.224}$ | = 4.46 |
| Ceiling insulated | $\frac{1}{0.092}$ | = 10.87 |
| | Difference = | 6.41 |

Heat Loss from House Uninsulated

| | | | |
|---|---|---|---|
| 1. | Wall | 1,938 sq. ft. × 0.277 × (70° — 0°) | = 37,578 B.T.U. |
| 2. | Ceiling | 812 sq. ft. × 0.224 × (70° — 0°) | = 12,732 |
| 3. | Floor | 812 sq. ft. × 0.339 × (70° — 60°) | = 2,752 |
| 4. | Doors | 42 sq. ft. × 0.432 × (70° — 0°) | = 1,270 |
| 5. | Windows | 300 sq. ft. × 1.13 × (70° — 0°) | = 23,730 |
| 6. | Air change | $15,433 \text{ cu. ft.} \times \frac{(70^\circ - 0^\circ)}{55}$ | = 19,642 |
| | | | 97,704 B.T.U. |

(Specific heat of air = 0.0183 at 62° F.
∴ 1 B.T.U. heat raises 55 cu. ft. air 1° F.)

7. Double windows 0.45 × 300 sq. ft. × (70° — 0°) = 9,450

Total heat loss with double windows = 83,424 B.T.U.

∴ Reduction in heat loss on account of double windows $= \frac{14,280}{97,704}$ = 14.6%

With single windows, a reduction of 30% in the heat loss will necessitate a cut of 29,311 B.T.U. in items 1 and 2. To make the cut uniform on both walls and ceiling, item 1 will become:

$$37,568 \times \frac{50,310 - 29,311}{50,310} = 15,600 \quad 1a$$

Item 2 becomes 1—

$$12,732 \times \frac{50,310 - 29,311}{50,310} = 5,208 \quad 2a$$

In order to make items 1 and 2 read 1a and 2a, it will be necessary to add sufficient insulation to walls and ceiling

Table 1 shows the thickness of insulation required in the house to give a 30% reduction in heating plant size and in fuel used, using the resistances above.

TABLE 1

| Thermal Conductivity of Insulation Used | Resistance | Thickness of Insulation Required, In. |
|---|---|---|
| | WALLS | |
| 0.30 | 3.33 | 1.5 |
| .33 | 3.00 | 1.7 |
| .35 | 2.86 | 1.8 |
| .40 | 2.50 | 2.0 |
| .45 | 2.22 | 2.3 |

| | | |
|---|---|---|
| | CEILING | |
| 0.30 | 3.33 | 1.9 |
| .33 | 3.00 | 2.1 |
| .35 | 2.86 | 2.2 |
| .40 | 2.50 | 2.6 |
| .45 | 2.22 | 2.9 |

**For Fuel Reduction of 20%**

With single windows, a reduction of 20% in the heat loss will necessitate a cut of 19,541 B.T.U. in items 1 and 2 above.

To make this reduction uniform on both walls and ceiling will mean that item 1 will become:

$$37{,}568 \times \frac{50{,}310 - 19{,}541}{50{,}310} = 22{,}917 \text{ (1a)}$$

Item 2 becomes:

$$12{,}732 \times \frac{50{,}310 - 19{,}541}{50{,}310} = 7{,}767 \text{ (2a)}$$

In order to make items 1 and 2 reach 1a and 2a, it will be necessary to add sufficient insulation to walls and ceiling to reduce the unit heat flow thus:

$$\frac{22{,}917}{1{,}938 \times 70^\circ \text{ temp. diff.}} = 0.169 \text{ for walls}$$

$$\frac{7{,}767}{812 \times 70^\circ} = 0.136 \text{ for ceiling}$$

TABLE 2

| Thermal Conductivity of Insulation Used | Resistance | Thickness of Insulation Required, In. |
|---|---|---|
| | WALLS | |
| 0.30 | 3.33 | 0.7 |
| 0.33 | 3.00 | 0.8 |
| 0.35 | 2.86 | 0.8 |
| 0.40 | 2.50 | 0.9 |
| 0.45 | 2.22 | 1.0 |
| | CEILING | |
| 0.30 | 3.33 | 0.9 |
| 0.33 | 3.00 | 1.0 |
| 0.35 | 2.86 | 1.0 |
| 0.40 | 2.50 | 1.2 |
| 0.45 | 2.22 | 1.3 |

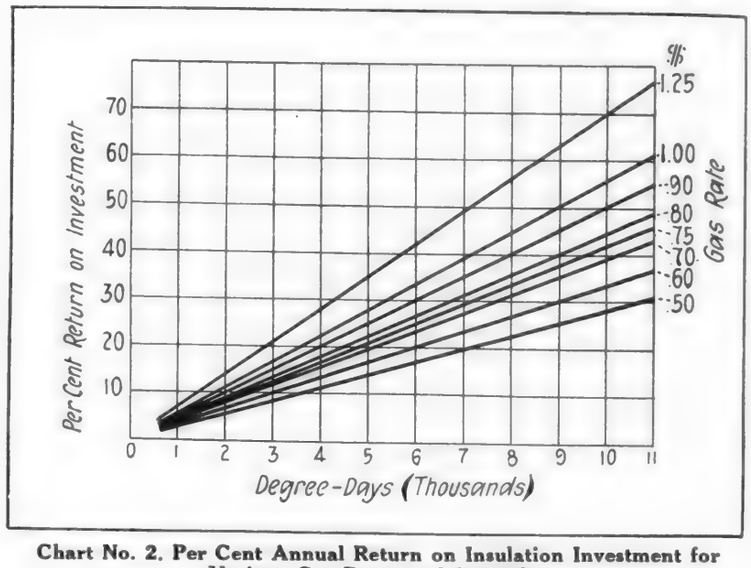


**Chart No. 2. Per Cent Annual Return on Insulation Investment for Various Gas Rates and Latitudes**

The thickness of insulation required to make the reductions shown above will be dependent on the conductivity of the material to be used for insulation. A calculation of the thickness is best carried out by considering the thermal resistances of the constructions concerned. The resistances follow:

| | | |
|---|---|---|
| Wall uninsulated | $\frac{1}{0.277}$ | = 3.61 |
| Wall insulated | $\frac{1}{0.169}$ | = 5.92 |
| | Difference | = 2.31 |
| Ceiling uninsulated | $\frac{1}{0.224}$ | = 4.46 |
| Ceiling insulated | $\frac{1}{0.136}$ | = 7.35 |
| | Difference | = 2.89 |

The differences in thermal resistance indicated above are used to calculate the table below.

The table below shows the thickness of insulation required in the house to give a 20% reduction in the heating plant size and in the fuel used.

If we take the average cost* of insulating materials per unit of resistance as $29.12, for this residence, the cost of insulation necessary to make a 30% reduction will be:

Walls

$29.12 × 1.938 × 5.08 resist. = $286.67

Ceiling

$29.12 × 0.812 × 6.41 resist. = $151.56

$438.23

Cost of insulating same residence for a 20% reduction:

Walls

$29.12 × 1.938 × 2.31 resist. = $130.36

Ceiling

$29.12 × .812 × 2.89 resist. = $68.33

$198.69

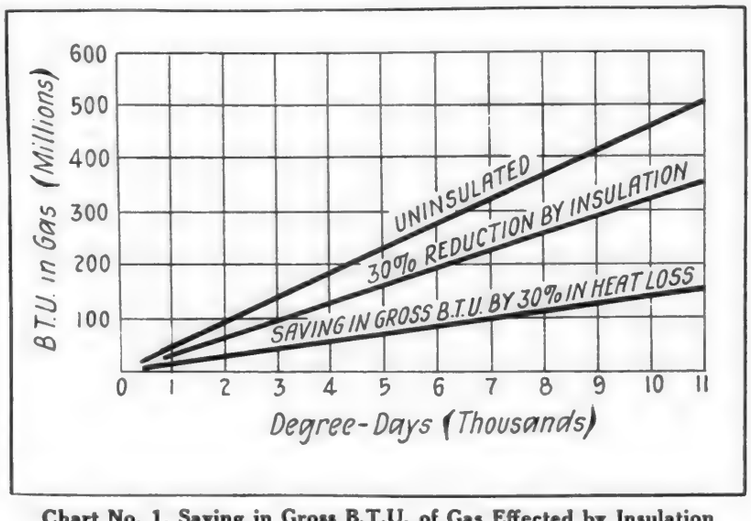


**Chart No. 1. Saving in Gross B.T.U. of Gas Effected by Insulation in Various Latitudes**

## II. Average Saving in First Cost of Radiation and Boiler Due to Saving by Insulation

It is very interesting to note the average saving in first cost of radiation and boiler due to saving by insulation in the specified house. The estimated heat loss from the uninsulated house with single windows is 97,704 B.T.U.; or the required water radiation is 651 sq. ft.

The estimated heat loss from the insulated house with single windows and sufficient insulation to effect a reduction of 30%, is 68,393 B.T.U.; or the required water radiation in this case is 456 sq. ft.

Assuming that the specified house requires nine water radiators with four sets of risers and returns, the average costs of installing 651 sq. ft. and 456 sq. ft. were obtained.

*Based on the cost per 1000 sq. ft. of 22 insulating materials per unit of resistance of same.

**Uninsulated House**

| | |
|---|---|
| Average cost for 651 sq. ft. installed with mains, risers, returns, and radiator trim, without pipe covering | $500.00 |
| Average cost per square foot | .77 |
| Average cost of gas-fired water boiler with trim and insulated jacket | 445.00 |
| Total cost | 945.00 |

**Insulated House**

| | |
|---|---|
| Average cost for 456 sq. ft. installed with mains, risers, returns, and radiator trim, without pipe covering | $400.00 |
| Average cost per square foot | .88 |
| Average cost of gas-fired water boiler with trim and insulated jacket | 369.00 |
| Total cost | 769.00 |

From the above figures it may be seen that the average saving effected by the insulation in the first cost of the boiler and radiation is approximately $176 or 18.6%.

### III. Saving in Gross B.T.U. of Gas Effected by Insulation in Various Latitudes

The saving in gross B.T.U. of gas fuel effected by the insulation employed is shown for various latitudes in Chart 1. To obtain the amount of saving in any case the following formula may be used:

Saving in B.T.U. per season $= (R_1 - R_2) \times G \times D \times H$

Where $R_1$ = Sq. ft of radiation uninsulated.

$R_2$ = Sq. ft. of radiation insulated

G = Cu. ft. of gas per sq. ft. of radiation per degree-day as per chart No. 4, Chap. 1, of 1928 edition of A.G.A. House Heating Manual. (Reprinted in THE HEATING AND VENTILATING MAGAZINE for November, 1928, as Data Sheet No. 50-A).

D = Degree-days for heating season.

H = Gross B.T.U. value of gas.

### IV. Per Cent Annual Return on Insulation Investments for Various Gas Rates and Latitudes

The percentage return on investment, i.e., the annual saving in fuel cost as compared with the initial cost of insulation, is shown in the accompanying chart. Since this return varies with climatic conditions and gas rates for a given per cent saving in heat loss, several curves are plotted for rates ranging from $0.50/M to $1.25/M cu. ft. (See chart 2).

The percentage return may be computed by substituting the proper values in the formula:

$$\text{Percentage return} = \frac{R \times G \times D \times C \times S}{1000 \quad I}$$

Where R = Sq. ft. radiation—building uninsulated.

G = Cu. ft. of gas per sq. ft. of radiation per degree-day as per Chart No. 4, Chap. I, of 1928 edition of A.G.A. House Heating Manual. (Reprinted in THE HEATING AND VENTILATING MAGAZINE for November, 1928, as Data Sheet No. 50-A).

D = Degree-days for heating season.

C = Gas rate per 1000 cu. ft.

S = Per cent saving effected by insulation.

I = Initial cost of insulation.

### V. Gross B.T.U. Demand for Insulated and Uninsulated House

Chart 3 shows the hourly demand in gross B.T.U. of gas fuel for the uninsulated and insulated house. The heat loss of the insulated house having been reduced by 30%, the efficiency of the heating appliance was assumed at 80%. It is not necessary to plot the curve showing the average reduction of demand obtained in various latitudes, as the reduction in demand caused by insulation is directly proportional to the reduction in heat loss.

The accompanying data show the effect of insulation in the home as regards the cost of heating. The localities have been selected with a view of making them as widely representative as possible, permitting studies of the various heating conditions throughout the country.

MILWAUKEE, WISCONSIN

COST OF HEATING RESIDENCE—SEASON 1926-27

Sidewalls and ceiling ½ in. board insulation as plaster base and for insulation

| Date | Domestic Consumption, Cu. Ft. | House-Heating Consumption, Cu. Ft. | Estimated Total, Cu. Ft. | Total Cost | House-Heating Cost |
|---|---|---|---|---|---|
| Nov. 30, 1926 | 6,300 | 69,600 | 57,000 | $60.93 | $53.68 |
| Dec. 29, 1926 | 5,700 | 67,600 | 79,000 | 58.98 | 52.42 |
| Jan. 27, 1927 | 6,000 | 72,700 | 89,500 | 63.03 | 56.13 |
| Feb. 25, 1927 | 5,800 | 62,700 | 77,000 | 55.38 | 48.31 |
| Mar. 24, 1927 | 4,000 | 35,000 | 69,000 | 33.25 | 28.65 |
| Apr. 27, 1927 | 5,700 | 48,800 | 46,000 | 44.88 | 38.52 |
| May 27, 1927 | 4,300 | 27,500 | 29,000 | 27.85 | 22.90 |
| Oct., 1926—bldg. under construction—estimated— | | 33,600 | 33,600 | 25.20 | 25.20 |
| Totals | 37,800 | 427,500 | 481,000 | $369.50 | $326.01 |

Gas company's estimate—431,200 cu. ft. @ 75c M = $325
Actual cost—$326.01
Degree-days—7,135
B.T.U. loss of house—84,000 per hr.

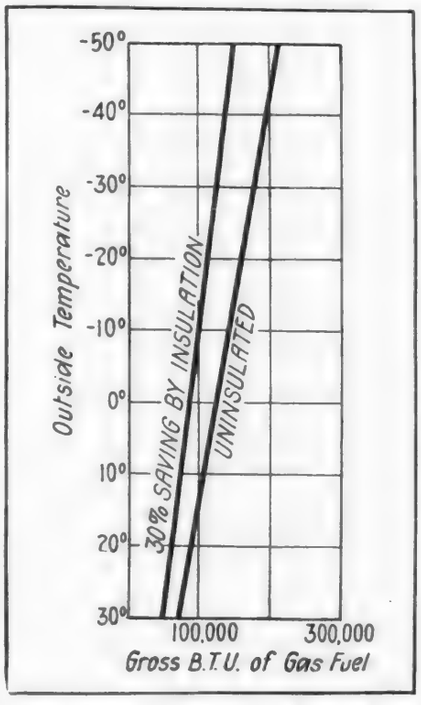


**Chart No. 3. Gross B.T.U. Demand for Insulated and Uninsulated House**

PEORIA, ILLINOIS

B.T.U. heat value of gas, 565 per cu. ft.

*Gas House-Heating Rate*

First.....2,500 cu. ft. @ $1.20 net
Next.....2,500 cu. ft. @ .90 net
All over .....5,000 cu. ft. @ .60 net
Plus a customer charge which is based upon the cubical contents, the exposed surface, and the square feet of glass in the house.

In the following case the customer charge is $3.12 per month. The heat loss of this house, considering insulation, is 65,300 B.T.U. per hr.

*Cost of Gas Heat with Insulated House*

7 rooms and bath

| | |
|---|---|
| October | $ 6.83 |
| November | 12.23 |
| December | 26.13 |
| January | 32.43 |
| February | 33.23 |
| March | 18.26 |
| April | 14.23 |
| May | 8.20 |
| Total | $151.54 |

**The Cost of Gas Heat Per Season for this Residence in Danville, Ill., Was $386.25**

DANVILLE, ILLINOIS

| | House | Garage (ceiling only insulated) |
|---|---|---|
| Cubical contents | 29,900 cu. ft. | 4,100 cu. ft. |
| Net wall surface | 2,425 sq. ft. brick veneer | 371 sq. ft. 9 in. brick |
| Glass surface | 543 sq. ft. casement windows | 124 sq. ft. d.h. |
| Ceiling | 1,760 sq. ft. lath and plaster | 410 sq. ft. lath and plaster |
| Floor | 1,760 sq. ft. double and plastered | 410 sq. ft. concrete |

3⅝ in. fill in side wall—4 in. in ceiling

| | Estimate | | Actual | |
|---|---|---|---|---|
| | M Cu. Ft. | Cost | M Cu. Ft. | Cost |
| October | 35.1 | $26.33 | 14.5 | $10.88 |
| November | 73.5 | 55.13 | 63.6 | 47.70 |
| December | 111.4 | 83.55 | 127.5 | *95.61 |
| January | 121.2 | 90.90 | 82.2 | 61.65 |
| February | 102.4 | 76.80 | 82.4 | 61.80 |
| March | 75.2 | 56.40 | 71.9 | 53.93 |
| April | 43.6 | 32.70 | 52.9 | 39.68 |
| May | 12.6 | 9.47 | 20.0 | 15.00 |
| Total | 575.0 | $431.25 | 515.0 | $386.25 |

*Meter read January 4, 1928.

ST. LOUIS, MISSOURI

*House No. 1*

3⅝ in. Walls and 4 in. Ceiling Loose Fill

| Year | Degree-Days | H. H. Consumption Actual | Est. on D.-D. | Diff. Actual and Est. Consump. | Per Cent Diff. from Estimated Cons. |
|---|---|---|---|---|---|
| 1925-26 | 4,775 | 330,000 | 377,200 | 47,200 | 12.5% |
| 1926-27 | 4,562 | 349,000 | 359,900 | 10,900 | 3.04% |

Cu. Ft. Gas per D.-D. $\frac{360,000}{4,560} = 79$

Degree-days based on actual degree-day between meter readings.

*Gas Company's Estimate for House No. 1, St. Louis*

| | Uninsulated | Insulated |
|---|---|---|
| Est. Consump. | 494,000 | 360,000 Cu. ft. |
| Degree-Days | 4,560 | 4,560 |
| Heat Loss per Hour, B.T.U. | | |
| Windows | 37,884 | 37,884 |
| Doors | 2,257 | 2,257 |
| Walls | 53,574 | 20,484 |
| Ceilings | 27,552 | 13,776 |
| Infiltration | 26,347 | 26,347 |
| | 147,614 | 100,748 |

Stucco, metal lath, studs, lath and plaster

Walls, stucco, metal lath, studs filled with loose fill; lath and plaster

Ceiling 3 in. loose fill over lath and plaster

*Actual and Estimated Gas Consumption Data for House No. 1, St. Louis*

1925-26

| Month | Degree-Days | House-Heating Consump. Actual | Estimated on D.-D. |
|---|---|---|---|
| Nov. | 712 | 46,600 | 56,200 |
| Dec. | 1,025 | 69,600 | 81,000 |
| Jan. | 987 | 61,400 | 78,000 |
| Feb. | 675 | 48,800 | 53,300 |
| Mar. | 764 | 57,800 | 60,400 |
| Apr. | 551 | 40,200 | 43,500 |
| May | 61 | 6,200 | 4,800 |
| June | | | |
| | 4,775 | 330,000 | 377,200 |

1926-27

| Month | Degree-Days | House-Heating Consump. Actual | Estimated on D.-D. |
|---|---|---|---|
| Sept. | 53 | 3,400 | 4,200 |
| Oct. | 218 | 21,400 | 17,200 |
| Nov. | 727 | 56,800 | 57,400 |
| Dec. | 981 | 71,200 | 77,500 |
| Jan. | 1,027 | 75,600 | 81,100 |
| Feb. | 577 | 44,200 | 45,600 |
| Mar. | 581 | 43,400 | 45,900 |
| Apr. | 310 | 23,400 | 24,000 |
| May | 88 | 9,600 | 7,000 |
| | 4,562 | 349,000 | 359,900 |

*Gas Consumption Data for House No. 2, St. Louis*

*1926-7*

| Month | Degree-Days | House-Heating Consump. Actual | Estimated on D.-D. |
|---|---|---|---|
| Oct. | 219 | 22,700 | 18,900 |
| Nov. | 756 | 63,700 | 65,500 |
| Dec. | 968 | 84,300 | 83,700 |
| Jan. | 1,019 | 89,700 | 87,200 |
| Feb. | 288 | 25,900* | 24,900 |
| Mar. | | House closed this month | |
| Apr. | 271 | 27,900 | 23,500 |
| May | 82 | 9,300 | 7,100 |
| | 3,603 | 323,500 | 310,800 |

*1927-8*

| Month | Degree-Days | House-Heating Consump. Actual | Estimated on D.-D. |
|---|---|---|---|
| Sept. | | | |
| Oct. | 142 | 14,500 | 12,300 |
| Nov. | 509 | 41,500 | 44,000 |
| Dec. | 952 | 69,700 | 82,400 |
| | 1,603 | 125,700 | 138,700 |

*House closed part of month.

*House No. 2, St. Louis*

| Year | Degree-Days | H. H. Consumption Actual | Est. on D.-D. | Diff. Actual and Est. Consump. | Per Cent Diff. from Estimated Cons. |
|---|---|---|---|---|---|
| 1926-27 | 3,603 | 323,500 | 310,800 | 12,700 | 4.1 |

Cu. Ft. Gas per D.-D. $\frac{395,000}{4,560} = 86.5$

Degree-days based on actual degree-days between meter readings.

*Gas Company's Estimate for House No. 2, St. Louis*

| | Uninsulated | Insulated |
|---|---|---|
| Est. Consump. | 576,000 cu. ft. per season | 395,000 |
| Degree-Days | 4,560 | 4,560 |
| Heat Loss per Hour, B.T.U. | | |
| Windows | 42,042 | 42,042 |
| Doors | 8,400 | 8,400 |
| Walls | 61,628 | 21,868 |
| Ceilings | 28,623 | 14,311 |
| Infiltration | 31,352 | 31,352 |
| | 172,045 | 117,973 |

Walls, shingles, sheathing, studs, lath and plaster

Walls, shingles, on sheathing, studs, filled 3⅝ in. fill
Ceiling 3½ in. fill over exposed ceilings

FALL RIVER, MASS.

| | | |
|---|---|---|
| Theoretical water radiation (uninsulated) | 598 sq. ft. | |
| Theoretical water radiation (insulated) | 430 sq. ft. | |
| Actual installed radiation | 466½ sq. ft. | |
| Insulation 1½ in. board in walls<br>2 in. board in ceiling | | |
| Gross cost of insulation: approximately | $500 | $500 |
| Savings—2,340 sq. ft. of lath @ 2½c sq. ft. | 58 | |
| Saving by using smaller boiler | 87 | |
| Saving by using smaller radiation | 53 | |
| Total savings | | 198 |
| | | $302 |
| 530 B.T.U. gas | Cost of gas per M cu. ft. | 75c |

| Month | Estimated Consumption Uninsulated, Cu. Ft. | Estimated Consumption Insulated, Cu. Ft. | Actual Consump. Mar. 1, 1927 to Mar. 1, 1928, Cu. Ft. | Outside Temperature, Deg. F. |
|---|---|---|---|---|
| Oct. | 26,000 | 19,100 | 13,700 | 56.3 |
| Nov. | 48,000 | 36,000 | 26,900 | 47.6 |
| Dec. | 70,000 | 53,400 | 49,200 | 35.7 |
| Jan. | 76,000 | 57,300 | 59,000 | 31.8 |
| Feb. | 67,000 | 50,700 | 50,200 | 29.2 |
| Mar. | 54,000 | 40,800 | 41,600 | 41.3 |
| Apr. | 37,000 | 28,200 | 29,200 | 46.6 |
| May | 18,000 | 14,100 | 15,700 | 55.3 |
| | 396,000 | 299,600 | 285,500 | |

Estimated saving by insulation—110,500 cu. ft.
Estimated saving by insulation @ 75c per M cu. ft.—$82.70

**Gas Heating for this House in Fall River, Mass., Insulated with 1⅛ in. of Corkboard Cost $214.13 Per Season**

## Gas Appliance Testing Code and Installation Manual

For those readers of the magazine who are interested in gas heating, two books on gas appliance testing and installation, published by The Pacific Coast Gas Association, will prove of value. Gas Appliance Installation and Service Manual contains information for the service man on finding and repairing leaks, installing and connecting flues and vents, and the installation of piping. Selection, installation and maintenance of gas appliances are outlined, followed by data on ranges and water heaters. Information on connecting gas water heaters and making poor installation work properly is presented in a complete manner. House-heating appliances are discussed in considerable detail, and descriptions are included of the methods to be used in making surveys and installing warm-air furnaces, steam and water boilers and gas-fired radiators. Size 4½ in. x 6¾ in. Pp. 144. Price, $1.50.

Gas Appliance Testing Code was prepared for the use of laboratory engineers, manufacturers, and others who have occasion to test gas appliances. The introduction contains suggestions for organizing a laboratory, how to keep reports, and how to present the information obtained from tests so that it will be best understood. Necessary equipment for a gas appliance testing laboratory is listed in detail, and advice on the care of such equipment also is given. Every step necessary in the testing and calculations of the data obtained is explained. Sample log sheets are presented in full, and the methods of computing the heat lost in the flue gases, incomplete combustion and radiation are given for all types of boilers and furnaces. Attention also is paid to the testing of space heaters, fireplaces and gas-fired radiators.

Methods for testing industrial and miscellaneous appliances are outlined in as complete a manner as that for house-heating equipment. Tables of engineering data complete the text of the book which will, no doubt, prove a valuable addition to the handbooks and manuals used by members of engineering departments and laboratory staffs. Size 5½ in. x 7¾ in. Pp. 144. Price, $5.

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**E. J. Stephany,** formerly assistant to the manager of sales and service of the Philadelphia Company, has been appointed secretary of the Natural Gas Department of the American Gas Association. Mr. Stephany also is secretary of the Pennsylvania Natural Gas Men's Association, an affiliated organization of the American Gas Association.

# American Public Health Association Discusses Air Pollution Problems at Annual Meeting

*By Peter H. Bryce, M. D.*

SO rapidly has the scope of the A.P.H.A. expanded that whereas, a few years ago, the program for its annual meeting could be handled in general sessions, it now has become necessary to devote no less than ten sectional meetings to various phases of public health problems.

At the annual meeting of the association, held in Chicago, October 15-19, three important papers were on the program of the association's Sanitary Engineering Section. One paper was devoted to carbon-monoxide pollution of air in Chicago, another to body-temperature regulation and other physiological reactions in relation to atmospheric conditions, while a third was devoted to schoolroom ventilation, with particular reference to the experiments started in 1926, by the New York Commission on Ventilation, in Syracuse, N. Y. It was presented by Thomas Duffield, secretary of the commission. Other speakers on the general subject of schoolroom ventilation were Leonard Greenburg, of Yale University; Lyman W. Childs, supervisor of health, Cleveland Board of Education, and H. T. Shaughnessy, secretary of the Department of Health, Chicago.

### Carbon-Monoxide Pollution of Air in Chicago

Under the direction of Matthew J. Monterick, sewer sanitary chemist, and John T. Aeberly, Jr., chief of the division of ventilation, Department of Health, Chicago, the results of the examination of 690 samples of air taken at selected points of traffic in Chicago streets were given and proved of much interest and importance. The most recent methods of testing for carbon monoxide in air, capable of detecting 0.1 part in 10,000 of air were described. Samples of street air were taken between high buildings, at street corners and in double-decked streets at hours during which traffic was most congested, and some quite definite conclusions were noted.

The samples were taken 3 ft. above the ground, both for ease of taking and because it is at that level that children, who are most injuriously affected, breathe street air. In some cases air at this level enters the windows of workrooms, and it has been found that it is the long-continued exposure to CO poisoning which produces the most injurious effects with ordinary dosage, as, for example, the fact that traffic policemen stationed for hours at the same corners have shown injurious effects. While death takes place at 60% of blood saturation, it is obvious that much injury will be done at lower exposures if long continued. The air of parallel streets, auto-streets, residential downtown and covered streets, were all sampled and results noted. CO rose as high as 1 part per 10,000 on the Boulevard and was greatest in the Loop, with

The following tables illustrate the results of the studies of the Syracuse Schools for two school years compiled by Mr. Duffield.

TABLE 1

Number and Type of Ventilation of Schools Included in the School Ventilation Study — Syracuse, N. Y.

| Type of Ventilation | | Number of Schools | |
|---|---|---|---|
| Supply | Exhaust | 1926-27 | 1927-28 |
| Fan | Fan | 2 | 4 |
| Fan | Gravity duct | 1 | 3 |
| Window | Fan | 0 | 2 |
| Furnace | Gravity duct | 3 | 3 |

Table 2

Average Number and Average Age
Percentage Distribution of Pupils by Sex and Nationality of Parents
(Entire Year)
By School and Type of Ventilation
School Ventilation Study—Syracuse, N. Y., (1927-28)

| School | Average No. of Pupils | Average Age of Pupils | Percentage Distribution of Pupils By Sex | | Percentage Distribution of Pupils by Nationality of Parents | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | American | | | | |
| | | | Male | Female | White | Colored | Jewish | Italian | Other Foreign |
| **Fan-Fan** | | | | | | | | | |
| Danforth | 380 | 9.5 | 49.9 | 50.1 | 86.6 | —— | 4.7 | 2.9 | 5.3 |
| Franklin | 213 | 8.5 | 50.3 | 49.7 | 28.5 | —— | —— | 50.3 | 21.2 |
| Madison | 391 | 9.6 | 51.8 | 48.2 | 55.1 | 6.9 | 22.6 | 3.1 | 12.3 |
| Seymour | 522 | 10.0 | 49.3 | 50.7 | 64.1 | 1.0 | 0.9 | 18.1 | 15.9 |
| TOTAL | 1506 | 9.6 | 50.2 | 49.6 | 64.2 | 2.1 | 7.4 | 14.9 | 13.2 |
| **Fan-Gravity** | | | | | | | | | |
| Lincoln | 426 | 9.2 | 50.6 | 49.4 | 92.9 | —— | 0.7 | 3.9 | 2.5 |
| McKinley | 409 | 9.4 | 50.7 | 49.3 | 90.1 | —— | 0.6 | 9.2 | 0.1 |
| Salem Hyde | 290 | 9.1 | 51.8 | 48.2 | 89.0 | —— | —— | 10.5 | 0.5 |
| TOTAL | 1125 | 9.2 | 51.0 | 49.0 | 90.9 | —— | 0.5 | 7.5 | 1.1 |
| **Window-Fan** | | | | | | | | | |
| Elmwood | 382 | 9.2 | 50.0 | 50.0 | 92.3 | —— | 1.4 | 2.9 | 3.4 |
| Wash. Irving | 609 | 9.8 | 51.5 | 48.5 | 34.9 | 11.9 | 35.5 | 3.5 | 14.2 |
| TOTAL | 991 | 9.6 | 51.0 | 49.0 | 57.0 | 7.3 | 22.4 | 3.2 | 10.1 |
| **Furnace-Gravity** | | | | | | | | | |
| Merrick | 243 | 8.8 | 48.7 | 51.3 | 92.0 | —— | 2.7 | 1.0 | 4.3 |
| Montgomery | 310 | 9.7 | 49.2 | 50.8 | 53.6 | 3.2 | 13.2 | 7.4 | 22.6 |
| Townsend | 212 | 7.9 | 55.3 | 44.7 | 2.6 | —— | —— | 97.4 | —— |
| TOTAL | 765 | 8.9 | 50.7 | 49.3 | 51.7 | 1.3 | 6.2 | 30.3 | 10.5 |

0.83 part CO per 10,000 parts of air. There was 0.6 CO in 10,000 where there were 400 to 1000 cars in 10 min.

The conclusion gained from the experiments were:

1. In general the quantity of CO caused no hazard.
2. At times CO is a menace on the Boulevard.
3. Double-decked streets may be injurious to persons inhabiting them and demand mechanical ventilation.
4. The stack or draft effect of high buildings is not enough to cause adequate interchange of air, since the higher they are, the greater is the concentration of CO which follows.
5. The poisonous effects of one part in 10,000 on children continuously exposed would be very serious.

### Director Houghten Presents Review of the A.S.H.&V.E. Research Laboratory Tests on Air Conditioning

The second paper, dealing with body temperature and other physiological reactions, in relation to atmospheric conditions, was fully illustrated by a series of slides arranged by F. C. Houghten director of the Research Laboratory of the American Society of Heating and Ventilating Engineers at Pittsburgh. These splendidly showed the various factors which enter into the condition called an "effective temperature." The author remarked that it is surprising to think that this most important *constant* in relation to respiratory diseases should so long have been neglected, when 27 lbs. of air are inhaled daily by one individual.

The series of slides showed the results of cabinet experiments on persons with clothing of different thickness, both at rest and at work. The tests were made at intervals from the room adjoining the cabinet, and the heat exchanges made by radiation and convection were both noted.

Tests were made for as long as four hours at a time on the same individual, while his loss of weight through $CO_2$ and evaporation was estimated by taking the temperatures several times.

The large set of slides served to illustrate admirably how the sense of individual comfort and health has a direct relation to the continued maintenance of the "effective temperature" in which a relative *constant* is maintained between temperature, humidity and air movement.

### Symposium on Schoolroom Ventilation

These papers supplied an admirable introduction to the symposium on ventilation. In opening the subject Leonard Greenburg stated that in some New Haven school tests 47% of all diseases were among the youngest children and were notably more marked in schools with mechanical ventilation. The experiments made by Mr. Childs, of Cleveland, were incomplete, as he confessed to having difficulty in determining what to do, no help being available from either city engineers or physicians. The committee under his direction found that 60% of absences, according to the teachers, was due to colds. Mr. Childs tested conditions under mechanical and window ventilation following the New York State Commission's method. The window-ventilation tests were all made in old buildings while the fan-ventilation tests were confined to new buildings. He did not equip windows with slanting boards, but some six changes of air were noted with two inlets above the floor, in the case of window ventilation, while some rooms had no air outlets except the windows. Tables were presented showing the results of the tests in detail.

The tests were carried on from February 6 to March 23, 1928. It was found that colds varied in proportion to the cubic air space for the children and that rooms with no air outlets gave the best results. A higher percentage of colds was reported in fan-ventilated schools but no tests were made for humidity or air movement.

TABLE 3

Crude Attendance and Health Records
By Type of Ventilation
School Ventilation Study — Syracuse, New York.
1926-27 and 1927-28.

| School Year | Attendance and Health Records (1) Total Absence | Absence Due to Respiratory Illness | Respiratory Illness Among Pupils Present | Total Incidence of Respiratory Illness |
|---|---|---|---|---|
| **Mechanical Ventilation (Fan-Fan and Fan-Gravity)** | | | | |
| 1926-27 | 7.2 | 3.0 | 12.6 | 15.6 |
| 1927-28 | 7.0 | 2.2 | 2.7 | 4.9 |
| Mean | 7.0 | 2.4 | 5.4 | 7.8 |
| **Natural Ventilation (Furnace-Gravity)** | | | | |
| 1926-27 | 4.9 | 1.8 | 7.0 | 8.8 |
| 1927-28 | 5.7 | 2.1 | 4.2 | 6.3 |
| Mean | 5.4 | 2.0 | 5.4 | 7.4 |
| **Window-Fan** | | | | |
| 1926-27 | — | — | — | — |
| 1927-28 | 9.0 | 2.4 | 2.5 | 4.9 |

(1) Rate per 100 pupil sessions.

### Syracuse Tests of the New York Commission

In the experiments carried on by the New York Commission in Syracuse, in 1926, seven schools were tested, and grouped as to race and age and social

TABLE 4

Summarized Attendance and Health Records (1)
By Race Stock of Pupils

School Ventilation Study — Syracuse, N. Y. (1927-28)

| Race Stock of Pupils | Total Absenteeism | Absences Due to Respiratory Illness | Respiratory Illness Among Pupils Present | Total Respiratory Illness |
|---|---|---|---|---|
| Italian | 4.0 | 1.6 | 10.5 | 12.1 |
| American | 6.7 | 2.7 | 1.9 | 4.6 |
| Numerous | 8.6 | 1.9 | 2.3 | 4.2 |
| All Schools | 7.2 | 2.3 | 2.9 | 5.2 |

TABLE 5

Absenteeism Due to Respiratory Illness (1)
By Race Stock of Pupils and Type of Ventilation

School Ventilation Study — Syracuse, N. Y.

| Type of Ventilation | Race Stock | | | |
|---|---|---|---|---|
| | All | Italian | American | Mixed |
| | | 1926-27 | | |
| Fan-Fan | 2.9 | — | 3.5 | 2.5 |
| Fan-Gravity | 3.4 | — | 3.4 | — |
| Furnace-Gravity | 1.8 | 1.0 | 2.4 | 2.0 |
| All | 2.5 | 1.0 | 3.2 | 2.3 |
| | | 1927-28 | | |
| Fan-Fan | 1.9 | 1.9 | 2.2 | 1.7 |
| Fan-Gravity | 2.7 | — | 2.7 | — |
| Window-Fan | 2.5 | — | 3.3 | 2.0 |
| Furnace-Gravity | 2.1 | 1.2 | 2.5 | 2.2 |
| All | 2.2 | 1.6 | 2.7 | 1.9 |

(1) Rate per 100 Pupil Sessions.

status, with a view to a fair comparison. Four schools were mechanically ventilated and three had simple window ventilation. Some were old buildings with heating of many years' installation, and had an average of 253 cu. ft. of air space to each child. The windows had slanting boards equal to 24 sq. ft. openings, with outlets at the floor.

The number of children was 2,052 in mechanically-ventilated, and 1,546 in window-ventilated rooms. Nurses were utilized to determine what was a cold or a sore throat. The absence in each case was duly recorded with the cause and a statement as to whether made by a nurse or doctor. School temperatures were taken by the teacher or a pupil four times daily. The first totals showed a fair average for mechanically-ventilated schools—7% of absentees in 1927 and 1928, and 5.4% for window ventilation; also that there were 2.4 absent due to the respiratory diseases in mechanically-ventilated, and 2% in those having window ventilation. The study of temperature variations did not indicate any notable differences, but no tests were made for humidity or air movements. The accompanying tables illustrate the result of the studies of the New York Commission in the Syracuse schools during two school years.

As these experiments extended over two school years, they would seem, in some degree, to indicate great variations for the same conditions between the two years for mechanical ventilation. Thus, in 1927-28, absences due to respiratory illness were nearly 50% less than in 1926-27, when the respiratory illness in pupils present was in 1927-28 only one-sixth of that in 1926-27. On the other hand, it is seen in Table 3 that while the total absences in 1927-28 were 25% more than in 1926-27, and the absences for respiratory diseases nearly 50% greater, yet the cases in children present were 4.2% as compared with 7% in 1926-27. The simple explanation seems to be that the information obtained in 1926-27 was imperfectly given.

Another very interesting figure is seen in the table where the total absences for window and fan ventilation were 9%, though the respiratory diseases in the children present were lower than in any other, or about the same as in mechanical ventilation.

The average ages of the children in all schools, as seen in Table 2, were much the same and did not affect the averages; while the same might be said for the sex distribution. Different schools, however, varied notably in the racial distribution, as where Madison had 22.6% Jewish, and Franklin 50% Italian, Townsend had 97.4% Italian, and Washington 35.5% Jewish.

It is very desirable that a closer study of this distribution be made, since general experience, as seen in Table 5, would indicate that such foreigners either live more simply, are more sturdy or are more desirous of attending school than the average American child, as seen in both years. The figures, 10.5% and 12.1% (in Table 4) for respiratory diseases in Italians present, seems to make this plain, since, though present, they had five times as much respiratory illness as the Americans.

A careful study of these extended figures, would seem, however, to show so many variations in these several factors of race percentage distribution in different schools, and in the presence of children with colds as to make it impossible to draw any satisfactory conclusions as to the influences of either or any class of ventilation tested, whether window or fan; but especially is this true when the fan-ventilated schools in almost no case were modern and in no case were the other factors of humidity and air-movement accurately estimated.

In the discussion, however, it appeared that a too rapidly moving current of hot, dry air, as might be expected, injuriously affected children within the sphere of its influence.

In the discussion Prof. A. C. Willard, president of the A.S.H. & V.E., stated that as a teacher for 25 years in every kind of school, he thought his experience entitled him to have an opinion on the subject discussed. He said he could accept all the tables and figures as being prepared carefully, and that the fan system as presented seemed definitely inferior to window ventilation. But when nothing was given as to the amount or area of windows, no record of variations of temperature and nothing said with regard to humidity or average air-movement, it must be apparent that no satisfactory conclusions could be drawn.

He insisted that the task placed upon teachers in addition to that of teaching is not to be encouraged, and that means must be found whereby the ventilation and heating of schoolrooms is carried out automatically. The essential demand is the maximum of human comfort for children and teacher, since this means general health, and we have a right to demand as much from the heating and ventilating engineers.

He considered the series of papers and the discussion valuable, and believed something practical should be the outcome if cooperation between engineers, sanitarians and school authorities could be brought about.

Professor Winslow thanked the section for arranging the symposium and for the practical way in which Professor Willard had dealt with the problem. Doctor Bryce urged that when so much work had been done of an experimental kind, based on the physics of air, it seemed absurd that there should not be arranged a cooperation of effort by which some school authority or fund should supply the means whereby an up-to-date school building could be built under the supervision of those who have been carrying on the several experiments.

# Correspondence

## Smoke Stack Built of Plumbing Material Does Not Produce Draft

EDITOR HEATING AND VENTILATING MAGAZINE:

I am enclosing a sketch of a smoke stack for a church, a stack which is of an uncommon kind in this neighborhood, and which has not operated very well for the past three years. A new boiler now is being installed, consequently we would like to locate the trouble.

The cast-iron smoke stack stands in the center of a vent shaft taking foul air from the auditorium. Some engineers claim that the air around this pipe retards the draft by cooling it while others say that this condition should increase the draft.

The vent shaft can be separated from the smoke stack if it is necessary to build a new stack of brick inside of the shaft. A larger shaft would be too expensive as the present shaft extends 5 ft. above the deck of the main roof or 25 ft. above the eaves. Foul air could be taken out by means of a fan should the vent space be required for a new inside stack. What size of stack should be built?

Two boilers were installed originally, the total radiation, including the mains, being 4500 sq. ft. of direct surface. The new 3600 sq. ft. boiler will carry the building in mild weather and one old boiler will be left so that the two boilers together will take the entire load in cold weather, therefore the size of stack should be figured on the basis of 5000 sq. ft. of net radiation load including the mains.

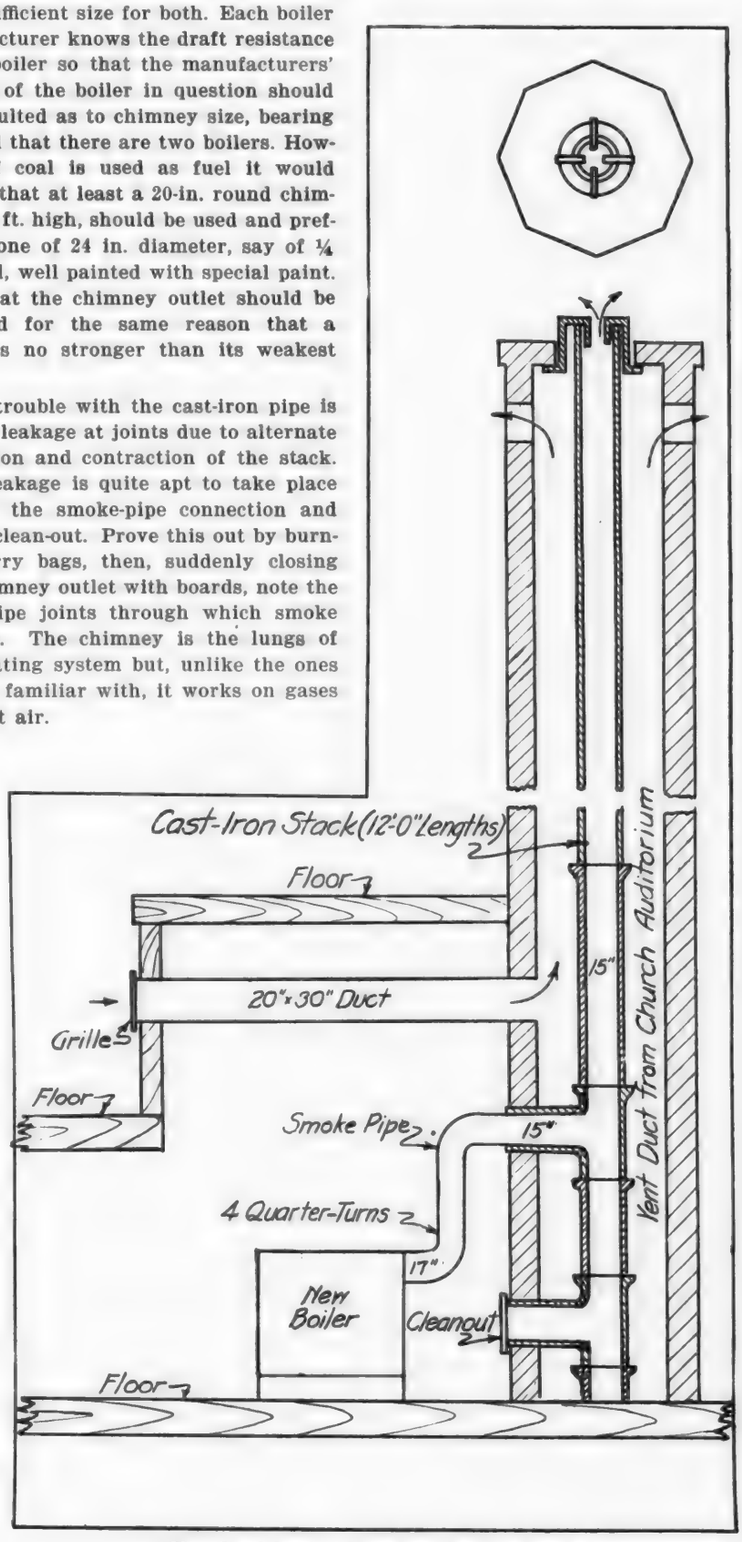
The stone cover on top of the air shaft where the slab meets the cast-iron pipe is carried by ¾-in. iron hangers hung over the open end of the pipe. These, of course, reduce the area of the pipe somewhat.

Knoxville, Tenn. J. A. A.

Cast-iron pipe is about the last thing that should have been used for a smoke stack. The use of this pipe, coupled with insufficient stack area and bends in the smoke pipe from boiler to smoke stack, is no doubt the cause of the trouble. Four bends are often spoken of as equivalent to a plug, as the bends offer considerable resistance to the flow of gases. This pipe should be as short as possible, or if necessarily long it should be well covered to conserve the heat which produces the draft within the pipe. The chimney should not be less in diameter than that of the boiler outlet, preferably it should be of increased size and, where connected to two boilers, it must be of sufficient size for both. Each boiler manufacturer knows the draft resistance of his boiler so that the manufacturers' catalog of the boiler in question should be consulted as to chimney size, bearing in mind that there are two boilers. However, if coal is used as fuel it would appear that at least a 20-in. round chimney, 55 ft. high, should be used and preferably one of 24 in. diameter, say of ¼ in. steel, well painted with special paint. Straps at the chimney outlet should be removed for the same reason that a chain is no stronger than its weakest link.

The trouble with the cast-iron pipe is the air leakage at joints due to alternate expansion and contraction of the stack. Such leakage is quite apt to take place also at the smoke-pipe connection and at the clean-out. Prove this out by burning tarry bags, then, suddenly closing the chimney outlet with boards, note the open pipe joints through which smoke escapes. The chimney is the lungs of the heating system but, unlike the ones we are familiar with, it works on gases and not air.

A stack with but little air motion around it will have a film of heated air clinging to it. This reduces the temper-




Sketch of Leaky Cast-Iron Smoke Stack

ature difference between the inside and outside of the stack and therefore reduces the loss of heat and draft, but if this film is removed by air currents as fast as formed the temperature difference is increased and with it the loss of heat or draft.

The smoke stack heats up the vent shaft, thus making it more effective as a foul air remover. In heating up the shaft it reduces the temperature difference between the gases in the stack and the air in the shaft, thus decreasing the stack losses to a slight extent. This, however, is more than offset by the increased velocity of the air over the stack as brought about by the greater temperature of the air. A fan would still further increase the velocity or wiping effect on the stack. However, this is not severe enough to cause concern. It is not the cause of the trouble in question.

T. W. Reynolds

## Heating a Suburban Home with Gas

Editor Heating and Ventilating Magazine:

In the article by E. C. Uhlig in The Heating and Ventilating Magazine for October, the author has performed a valuable service in supplying authentic figures on gas consumption. It is unfortunate that the effectiveness of his otherwise constructive remarks should have been marred by tacking on a careless and unscientific cost comparison.

Anthracite consumption is approximately three short tons per average heating season per 100 ft. of actual steam radiation provided in homes in the vicinity of New York City. On this basis Mr. Uhlig's house would have required $3.57 \times 3 = 10.71$ tons of anthracite to obtain the same heating effect as the 299,400 cu. ft. of gas which he used during the season.

The estimated cost for anthracite should have been $155 for coal, plus $90 for attendance, a total of $245, and not $336.50. Also, the radiation provided is ample for a frame house, paper-lined, on the basis of the detail as to size of rooms, outside wall, roof exposure, etc., given by Mr. Uhlig, so that this figure for anthracite will apply for this construction, whereas Mr. Uhlig's gas figures are applicable to a completely cork-insulated house.

Mr. Uhlig's estimated costs for gas heating also are inaccurate, if he proposes to compare them with cost for anthracite heating, as he makes no allowance for interest and depreciation of the cost of gas plant additional to the cost of plant for firing anthracite. This will add about $70 a year to his gas figures, making his total approximately $414 for heating his insulated seven-room house with gas, as compared with about $245 for heating a similar uninsulated house with anthracite.

Noel Cunningham

New York, N. Y.

## Mechanical Equipment for Tall Buildings

Editor Heating and Ventilating Magazine:

What are the modern tendencies regarding mechanical equipment of tall buildings? For instance, how are the very latest bank interiors being ventilated? Are they using unit heaters or the old plenum chamber method? Are they conditioning air or not? Are the modern tall buildings putting in automatic control in each office or not?

How are they handling their water supply where the upper floors are considerably above the street water pressure? How are they handling the variations in pressure on the fixture due to height of buildings?

Richmond, Va. J. A. J.

Answering your questions in order:

1. Bank interiors are being ventilated both with exhaust and supply systems. In the new Guaranty Trust offices in New York, dry air filters are used, as well as ozone. In this class of work air washers seldom, if ever, are installed. In small quarters unit heaters give good service, but in larger quarters, duct systems remain in favor. It is interesting to know that unit heaters are being adopted with good effect in the entrances or lobbies of tall buildings in the place of direct radiation.

2. Regarding automatic control in each office in tall buildings, we presume you refer to the use of direct control valves. The New York Life Building is so equipped, but, as a rule, office buildings do not have automatic control.

3. The handling of the water supply in tall buildings usually is accomplished by splitting the buildings into sections. For instance, a building 200 ft. high would be equipped with one house tank and a set of pumps, while a taller building would have two tanks, one at the middle floor and one at the top. In the Chanin Building, one of the largest in New York, one set of pumps raises all the water to the 26th floor and water for the upper floors is pumped separately from that point.

4. Variations in pressure on the fixtures, due to the height of the building, are taken care of by means of reducing valves on the branch connections to the fixtures to function where the pressure is over 60 lbs.

## Penalty for Delay in Completion of Contract

Editor Heating and Ventilating Magazine:

Can a contractor legally be penalized at, say, $50 per day, for delay in finishing his work on time *without* also giving him a bonus for finishing his work ahead of time? In other words, is a penalty for delay binding unless a bonus for acceleration is included?

Philadelphia, Pa. R. P.

The provision in building and similar contracts for liquidated damages of so much per day in case of failure to complete the work on a specified date is a very usual one, and is enforced according to the intention of the parties without the necessity of a provision for a bonus for early completion. It would, of course, be open to the parties to provide for such a bonus. They can make their own contract.

The mere fact that the contract says "liquidated damages," however, does not mean that the sum specified can always be exacted. The provision, it is held, will be given effect to as written where it is the apparent intention of the parties that the specified sum shall be paid, and "where the damages are uncertain in nature or amount or are difficult of ascertainment, or where the amount stipulated for is not so extravagant, or disproportionate to the amount of property loss, as to show that compensation was not the object aimed at, or as to imply fraud, mistake, circumvention, or oppression." Wise v. United States, 249 U. S. 361.

So it is held that if the sum specified is entirely disproportionate to the actual damage, the provision will be treated as one for a penalty (or actual damage), even though it provides for liquidated damages. And where a municipal improvement contract required the contractor to pay a certain sum, $50, a day, as liquidated damages for delay in completion beyond a specified date, the municipality was not allowed to retain $6900 as liquidated damages when only nominal damages had been sustained. McCann v. Albany, 11 App. Div. 378, 158 N. Y. 634.

## Air Filter Manufacturers Organize

Manufacturers of air filters held a meeting at Buffalo, N. Y., recently and organized the Air Filter Association. The association is made up of representatives of the Reed Air Filter Company, Midwest Air Filters, Inc., National Air Filter Company, and the Air Filter Corporation. E. B. Cresap, of Chicago, was elected secretary.

# Modernizing Increased 18% in Philadelphia Through Sales Promotion Campaign

ACCORDING to permits on file at the City Hall, rehabilitation work in Philadelphia showed an increase of 18% for the period from March to August 31, over the corresponding period last year. This is the answer to the question "Is the Philadelphia campaign a success?" given by Ernest L. Flentje of the Plumbing and Heating Industries Bureau, in an address before the conference of advertising, sales and credit managers of the heating and plumbing industries at the recent conference held at the Palmer House, in Chicago.

In making the report on the Philadelphia campaign, Mr. Flentje said:

"Our activities have embraced the following fields: market analysis; retail outlet survey; analysis of consumer buying motives; newspaper advertising; direct mail advertising; sales instruction; window display; bookkeeping, and community exhibits of our industries' products. It is the first principle in market analyses that, in order to be satisfactory and practical, one must be able to answer the following questions: What are the prospects? How many of them are there? Where are they? Who are they? We believe that we can demonstrate by the materials we now have that we are able to answer all of the questions.

"We have broken down the families into rough income groups, so that you may see just how many of each income stratum we had to work on. It shows that only 15% of Philadelphia families have income over $3000 per annum and 22% have yearly incomes below $2000. The huge figure of 469,860 families inclines us to overestimate our market—we unconsciously think of hordes of people able to buy our products; but when we examine the standards necessary to purchase our industries' products we realize that all too few are able to buy our material.

"If only a small portion of the people are able to buy, it is incumbent on us to ascertain where they are; thus answering the third question incident to market analysis. We found the answer in Philadelphia.

"It is a well-known fact that people of like economic circumstances tend to congregate in well-defined areas, and these 43 Philadelphia economic zones show 43 more or less homogeneous spheres in which the economic characteristics of the people are similar. This study, embracing some 640,000 people, was made on the basis of visiting each tenth home on each street in Philadelphia, ascertaining the occupation of the home-owner and the income of those gainfully employed in the family. The incomes fluctuate between $1300 per family in one zone to an average of over $13,000 in other zones.

### Much Effort Has Been Expended Uselessly by Manufacturers Making Individual Surveys

"Before this study was made, selective merchandising was impossible. It meant that the manufacturer or wholesaler tried to blanket the city; but a great deal of such effort was wasted, except in the case of products which could be purchased by all of the population.

"We have listed 325,000 names of people who own and reside in their own homes. It takes but a moment's reflection to realize that these are the only prospects we have in our industries. Lodgers, tenants, and renters of homes are not in a position to purchase our industries' products. This list of names is arranged by streets and by wards so that any one interested in exploiting any section of the city has ready at hand a mailing list of every one of our prospects in the area under consideration.

"In our case, selling as we do through the master plumber, our next consideration should be: How many of them are there? Where are they located? What kind of display facilities have they? What energy are they likely to use in pushing our products? These four questions can be answered definitely. There are 1856 master plumbers and heating contractors in Philadelphia, although only 1652 of them actually are engaged in business. Of the total number of master plumbers and heating contractors in business, only 13% have showrooms, and 31% have display windows.

"We made personal visits to those 1652 contractors for the purpose of evaluating them as retail outlets. We first examined the appearance of their places of business; we next talked to them about their attitude toward aggressive merchandising, their plans for the future and their financial responsibility. On the basis of those interviews we assigned grades of 'good,' 'fair' and 'poor' to each of the retailers in the city. Examining those figures, we find that 17% merited the classification of 'good,' 46% 'fair' and 37% 'poor.' We find that only 36% of the contractors in Philadelphia have any external evidence of being in business. By that I mean that only 36% have a location that remotely resembles a retailing establishment or have other signs of being engaged in the plumbing and heating business.

"It seems to me that any sales promotion program, undertaken in any city, will be ineffectual and not productive of results if the material we have in Philadelphia is not duplicated for that community. The amount of work necessary for such a study is not as great as is popularly supposed. With this information on the market and in the retail outlets, you will be as we were in Philadelphia—prepared to undertake a constructive program of sales promotion with the knowledge of where you are headed and the tools with which you have to work."

Mr. Flentje further said that the experience of the Philadelphia campaign was that advertising in the newspaper was the easiest but not the most effective means of advertising. Direct-by-mail advertisements and advertising by means of community exhibits are better. Community exhibits were the outstanding feature of the campaign, and it was found that people will attend exhibits of heating and plumbing equipment just as well as they will visit radio and motor shows. These exhibits also showed that they are worth while from the point of sales. Nearly $13,000 worth of equipment was sold at the West Philadelphia exhibit.

Charles J. Crockett, sales counselor of Detroit, said that in order to find out why people buy heating and plumbing equipment, 1000 recent purchasers were interviewed. Of 500 who bought heating equipment to replace old systems, 66.7% said that they bought because of greater operating efficiency of the new equipment, and 5.6% because of low cost.

E. G. Byrd, field representative of the Heating and Piping Contractors National Association, told the conference that "certified heat is a good heating job dressed up for merchandising." He also declared that the members of the association will put out half a million mailing pieces on certified heat in 1929, and two and a half million pieces in 1930. The association has found that direct-by-mail advertising has obtained results three times more profitable than results from other kinds of advertising. Billboard advertising is rated second and newspapers third in the results obtained.

C. W. Wanger, of the Woodward-Wanger Co., Philadelphia, said that the Trade Development League of that city expects to continue the Philadelphia campaign with a budget twice as great as that of last year, and that they expect to raise all the money in Philadelphia without the assistance of the bureau.

"Advertising is direct and paid for. Publicity is indirect. You can't buy it. Yet publicity, because it is subtle and because it is impartial, is often more effective than paid advertising." With these terse statements, J. P. Moonan, advertising director of the American Radiator Company, and a member of the bureau's committee on advertising and publicity, explained the idea behind the bureau's plan to prepare articles for magazine publication.

Russell G. Creviston, general manager of the Plumbing and Heating Industries Bureau, stated that the invasion of the direct-to-you houses is due to the failure of manufacturers and wholesalers to keep pace with modern merchandising. The use of frequent style and color changes are characteristic of the merchandising methods of 1928. He deplored the failure of some wholesalers and manufacturers to train their salesmen to give merchandising assistance to their customers, and declared that every salesman should be a merchandising counsel, rather than a mere order taker.

The conference, which many of the 300 present declared to be the most stimulating meeting they had ever attended, was held in conjunction with the Central Supply Association.

## Home Modernizing Campaign Progresses

According to a statistical report of the Minneapolis home modernizing bureau, from August 12 to September 18, modernizing jobs completed or in process amounted to $16,615, while the amount of work that is being estimated by contractors amounted to $16,700. Plans have been completed for modernizing and are ready for estimating, amounting to $22,250, making a total of $55,565 of new modernizing jobs originated through the bureau.

Permanent organizations for home modernizing have been completed in four cities, Atlantic City, Kansas City, Mo., Minneapolis, Minn., and Topeka, Kan. Temporary organizations have been perfected in Cleveland, O., Duluth, Minn., Kansas City, Kan., St. Paul, Minn., San Francisco, Cal., and Washington, D. C. Informal meetings have been held and a first step taken towards the formation of a bureau in Buffalo, N. Y., Milwaukee, Wis., Omaha, Neb., and St. Louis, Mo.

# National Trade Journals, Inc., Acquires The Heating and Ventilating Magazine

THE announcement by National Trade Journals, Inc., of New York, of the purchase of THE HEATING AND VENTILATING MAGAZINE and the *Architectural Forum*, of New York; *Good Furniture*, Grand Rapids, Mich.; *Specialty Salesman Magazine*, of South Whitley, Ind.; and *Salesology*, of Chicago, brings into being, among other things, the most significant publishing project ever developed among trade journals in the building industry. These journals, which will operate under the title of National Building Publications, Inc., comprise a scientific group of several of the more powerful publications which are edited for this important division of buying power in the construction or building field.

*The Architectural Forum* is known throughout the industry as the leading journal of the architectural profession. In its two-part form, its editorial coverage includes part one—architectural design; part two—architectural engineering and business. Its powerful circulation reaches almost every important architectural office in the United States.

*Building Age* has been known for many years as one of the leading publications designed to reach contractors, sub-contractors and investment builders. More than ever, its new editorial contents are being carefully developed under the new ownership to meet the requirements of the average reader of the types indicated, whose buying influence and direct purchasing power form one of the important markets in the field of construction materials and equipment merchandising.

*The Home Builders' Catalog*, with its corollary services, represents a direct sales service for construction material dealers, through plan books, stock plans and other service features and thus renders a valuable direct service for local contractors, sub-contractors and prospective home builders.

THE HEATING AND VENTILATING MAGAZINE is a publication which has achieved a leading position among engineers, architects, jobbers and contractors of this tremendously-important subdivision of the building industry. The editorial function of this publication is to reflect the engineering progress of the heating and ventilating industry, to stimulate improvements in the design of heating, ventilating and air-conditioning equipment, apparatus and appliances, to disseminate information about such improvements and to place before its readers modern methods of merchandising the service of heating and ventilating contractors.

This grouping of publications also will include the publication entitled *Good Furniture* which will cover the field of furnishing homes by presenting artistic plans which will appeal to the owners, as to furniture, draperies and rugs, etc.

The major personnel in the editorial and business staffs of each publication will be kept intact and will be augmented wherever desirable.

The service and research division of the National Building Publications, Inc., will immediately become the most comprehensive and authoritative headquarters for all types of information relative to readers' problems and problems of advertising and merchandising in the markets of the building and construction fields and through the interchange of the knowledge and experience of each publication direct economic benefit will accrue to the entire building industry.

The officers of National Building Publications, Inc., are Heman J. Redfield, president; Joseph E. Browne, vice-president; John Thomas Wilson, vice-president; C. Stanley Taylor, vice-president; James A. Rice, vice-president; Howard Myers, vice-president and general manager; Henry J. Brown, Jr., secretary.

The board of directors include the above officers, with the addition of A. S. Armagnac and W. C. Shaughnessy.

## Welding Conference to be Held at Purdue

Announcement has been made that the fourth annual conference on welding will be held at Purdue University, Lafayette, Ind., December 12-14, under the direction of the engineering experiment station and the department of practical mechanics, with the school of chemical engineering and the manufacturers of welding equipment cooperating. The conference will be devoted to the applications of electric, oxyacetylene and thermit welding to manufacturing and repair operations. Provisions will be made for exhibits and demonstrations.

# American Society of Heating and Ventilating Engineers

## Conference on Methods of Calculating Heat Losses

A conference for the purpose of drawing up a uniform standard method for the calculation of heat losses from buildings, was held recently at the United States Bureau of Mines in Pittsburgh. At this meeting, which was called by Prof. A. C. Willard, president of the A.S.H. & V.E., it was agreed that a uniform basis should be devised which would be acceptable to all organizations interested in calculating heat losses.

The principal difference between the various methods now in use is that between the method given in the 1928 *Guide* and that used by the Heating and Piping Contractors National Association. The method used by the association is to analyze the weather bureau records for each location for temperature, wind velocities and direction of wind for each hour of the day for the months of January and February, and assume that 1 mile of wind velocity per hour is equal to 1° drop in temperature.

It is generally agreed that the analysis of weather bureau charts by the association was very complete and well worked out. However, there was a question as to the corrections for converting the wind velocity into an equivalent temperature drop. Ralph S. Franklin, representing the Heating and Piping Contractors National Association, stated that the results obtained by installing heating systems calculated by the methods used by this organization seemed to give better distribution of heat and less trouble than if calculated by the method used in the *Guide*. In using the constants from the *Guide*, they are converted to still air conditions by assuming them to be calculated on the basis of 15-mile wind velocity and then using the equivalent of 1-mile wind velocity for 1° drop of temperature. The association proposed that 1 lb. of steam pressure be used for calculations instead of the 2 lbs. at present used in the data in the *Guide*.

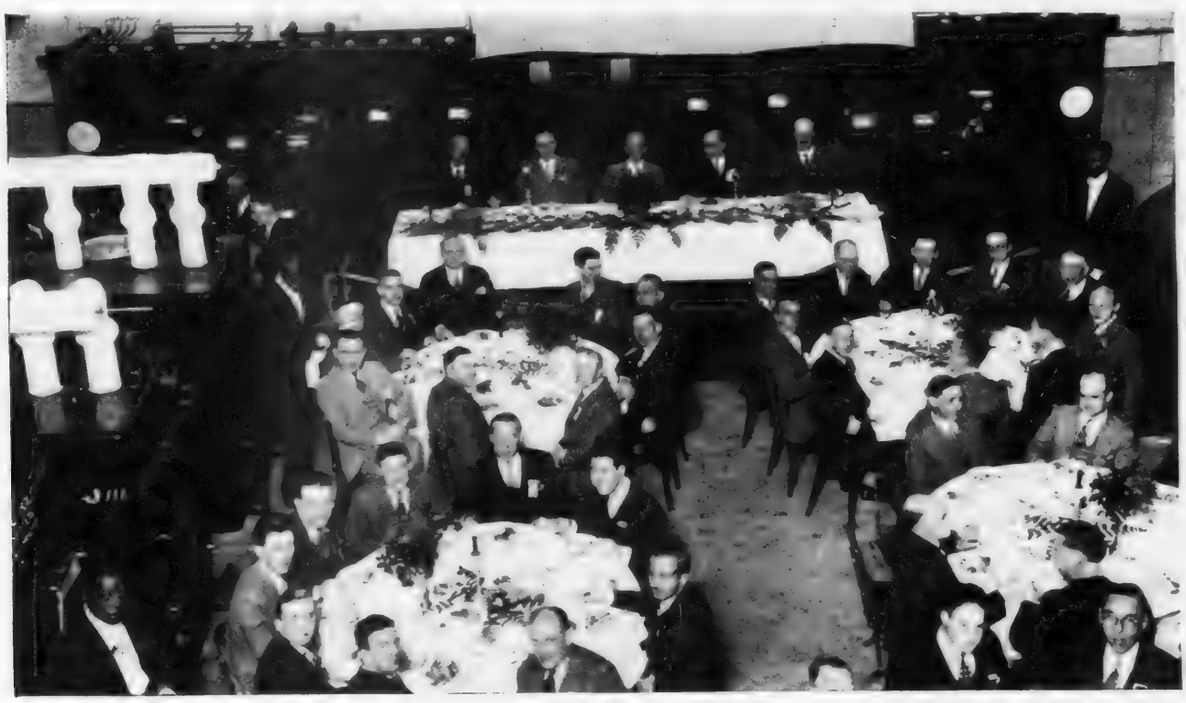
The question of proper inside air temperatures also was discussed and it was agreed that until a better method is proposed, the present basis of measuring the temperature at 3 ft. from the outside wall and 5 ft. from the floor be continued.

Those present at the conference and the societies represented are as follows: American Society of Heating and Ventilating Engineers, represented by F. C. Houghten and F. B. Rowley; Heating and Piping Contractors National Association, by Ralph S. Franklin and J. C. Fitts; American Gas Association, by C. G. Segeler; National Warm Air Heating Association, by C. M. Lyman; National District Heating Association, by W. W. Stevenson; Industrial Unit Heater Association, by John Holton, and the National Association of Fan Manufacturers, by W. A. Rowe.

Invited guests were members of the committee on standardization, of the Heating and Piping Contractors National Association, R. A. Wolff, New York; W. Rhoton, Cleveland; C. G. Lamb, Chicago; W. W. Hubbard, New York.

## New York Chapter

Members of the New York Chapter were guests of the American Radiator Company at a dinner and meeting held at the company's Institute Thermal Research, Yonkers, November 12. Dr. Charles W. Brabbée, director of the Institute, was the speaker of the evening, and explained some of the features of the design and operation of the new magazine-feed boiler which has been developed by this company. He also made some interesting comments on the heating effect of various types of radiation. Among the examples of data which Doctor Brabbée has obtained from various tests was one in which two rooms of the same size, window area and exposure in the same building were tested simultaneously under identical conditions excepting only the position of the radiator. In the room a tubular radia-



**Speakers and a Few of the Guests at the New York Chapter Meeting at the American Radiator Institute Thermal Research**

tor was placed in an inside corner, while in the other room a flat type radiator was situated under the window. With a temperature of 76° at knee height in both rooms, the temperature was above 90° at the ceiling of the room with the tubular radiator, while with the flat-type the ceiling temperature was only a few degrees higher than at knee height. Although the heating effect was the same in both cases, the tubular radiator was condensing 16.3 lbs. per hr., while the flat one was condensing only 7.9 lbs. Dr. Brabbée pointed out that if one man used a motor car to ride to a distant city with the same speed and comfort as that obtained by a friend in a different make car, the machine which performed the trip on the less gas would be considered the better. However, when testing the comparative effect of radiators, the custom has been to rate them solely on their ability to condense steam. This, the speaker said, was analogous to rating a car's value on its ability to consume fuel, rather than to conserve it. The necessity of keeping heating surfaces clean was stressed, as Doctor Brabbée said that the dry distillation of dust causes much of our ill health.

R. A. Wolfe and A. A. Adler were elected as the representative and alternate, respectively, of the chapter on the nominating committee of the society.

## Illinois Chapter

H. B. Johns, manager of the house-heating division of the Peoples Gas Light and Coke Company, addressed the Illinois Chapter on the subject "Manufacture, Storage and Distribution of Gas," at the regular meeting of the chapter in the Hotel Sherman, Chicago, November 12.

Charles Paine, of the Rome Brass Radiator Corporation, William G. Bergner, of the Plumbing and Heating Industries Bureau, and A. L. Weixel, consulting engineer, were admitted to membership.

In his talk, Mr. Flink stated that Buffalo was fortunate in having a low gas rate and a high quality of gas which, when economically burned, costs only about one-third more than coal, while in New York City, and many other large centers, the cost under favorable conditions is more than double that of coal. He pointed out the numerous advantages gas has over coal as fuel in the home, among these being that: Gas requires no storage bins with the accompanying dust and dirt, and there are no ashes to be removed; no periodical attention is required; no money is tied up in stored fuel; there is no variation in temperature throughout the day; there is no variation in the heat value of the fuel being burned, and no deterioration in heat value due to storage from year to year. Another advantage claimed for the gas-fired boiler is that the efficiency is not gradually reduced throughout the heating season, due to an accumulation of dust which serves as an excellent insulator.

Gas-fired boilers are rated by taking 80% of the B.T.U. gas input as being converted into useful heat. The American Gas Association requires that gas-fired boilers show an efficiency of at least 75% and the average is about 80%.

A gas-fired boiler to meet the approval of the American Gas Association must show not more than .04 of 1% of CO in the flue gases. No condensation is experienced in the stack if the flue gases do not drop below 280°-300° F.

In Buffalo and other cities which experience temperatures of about zero with temperature of 70° in the home, the gas consumption for the season can be estimated by assuming that 800 cu. ft. of gas per season will be required per square foot of radiation installed. An occasional check-up on the meter will enable the householder to determine whether or not he is within the bounds of usual practice.

Automatic control is necessary to guard against excessive steam pressure, pilot light going out, and too low water level.

At the conclusion of the meeting a number of questions was asked, particularly with reference to the importance of secondary air. Excessive secondary air will reduce the temperature of the flue gases, and also the percentage of CO. However, this excessive secondary air will reduce the efficiency of the boiler materially.

Some boilers are equipped with a graduated control on the gas supply, and also control the secondary air, while other boilers have an on or off control of the gas and have the orifice for the secondary air fixed for manual control.

## Western New York Chapter

Carl Flink, of the American Radiator Company, addressed the first fall meeting of the Western New York Chapter of the society on the subject of "Gas Boilers and Their Use." There was good attendance at the meeting which was held at the Hotel Buffalo, Buffalo, November 12.

Officers elected for this chapter for the coming year are: President, C. A. Evans; vice-presidents, O. K. Dyer and F. H. Burke; treasurer, P. H. Schoepflin; secretary, T. A. Novotney.

## Willard to Address Massachusetts Chapter

Prof. A. C. Willard, president of the A.S.H. & V.E. and head of the school of mechanical engineering at the University of Illinois, will address the meeting of the Massachusetts Chapter of the society in Boston, December 3. Professor Willard has called a meeting of the Council of the Society in New York for December 6, and also will attend this meeting before returning to Urbana.

## Kansas City Chapter

Acoustical Engineering as Related to Heating and Ventilating was the subject of a talk given by H. P. Barnes before the regular meeting of the Kansas City Chapter of the society, November 20. Modern construction being lighter in weight than those used in the past, and modern building materials being good conductors of sound vibrations, the need for sound-proofing is greater than it formerly was. Sound-proofing, as distinguished from sound-correction, is the art of preventing sound vibrations, such as those set up by fans, compressors and other types of machines, from being transmitted into or by the material of the building, or through dead-air spaces where the drum action might intensify the sound.

It is particularly important to keep the vibrations out of steel and concrete because of their high sound conductivity. This may be accomplished by the use of a variety of floating platforms and insulated hangers, by canvas connection to fans, etc. Filling in three inches of any dead air space will prevent the drum action. Of particular interest to the heating and ventilating engineer is the deadening of sound in ducts in which the noise of machinery, the vibrations set up by the fan blades striking the air, and the material used in the ducts, all combine to make sound deadening difficult, and a solution all the more necessary.

Strips of acoustical material, if placed in ducts, will absorb these sound vibrations. The strips can be set at an angle to form slight obstructions to the flow of the air and all the strips can be on the same side of the duct. The area of absorbing surface is the principal factor, and will determine the success or failure of the installation. Necessary area depends on both the intensity and the volume of the sound waves.

As an experiment, the meeting was held between 5:30 and 8:00 p.m., so that the evening was not broken into as it would have been if held later.

## Michigan Chapter

Thurman Miller, of Wilmington, O., was the principal speaker at the November meeting of the Michigan chapter of the society, held in Detroit, November 12. The subject of the talk was "Sportsmanship in Life and Business." The second speaker of the evening was W. R. Rhoton, of Cleveland, O., who spoke of the aims of the standardization committee of the Heating and Piping Contractors National Association. In his talk he pointed out that most of the criticism which this committee has directed at the heating industry applies to cast-iron boilers which have been rated in a way to 'cause confusion. He defined a boiler rating as representing the utmost capacity a boiler could be expected to deliver under ideal conditions when fired by an expert fireman. What the committee is trying to do is to determine the rating of the boiler fired under average conditions, this rating to be a load which the boiler will easily carry.

Mr. Rhoton stated that in the near future the Heating and Piping Contractors National Association expects to publish new ratings which will show the manufacturers' boiler numbers and the maximum net steam and water ratings. These ratings will be based on the use of bituminous coal with a heat content of 11,000 B.T.U. per lb. This will not be a code, but an arbitrary rating which they hope will meet the approval of all concerned.

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## Acetylene Association Convention Features Welding

That there is a wide field for the use of the oxyacetylene process in cutting and welding was shown by the report of the oxyacetylene committee presented at the convention of the International Acetylene Association, held at the Congress Hotel, Chicago, November 14-16. This report set forth the present status of welding and cutting in the industries served by these processes.

The heating and ventilating industry is one of those which has used oxyacetylene processes to an increasing extent every year. The following is an excerpt from the report of the committee dealing with those branches of industry engaged in heating and ventilating:

"While the presence of cylinders and oxyacetylene equipment on all large building jobs has long been commonplace, the casual observer can hardly realize the rapidity with which the process has grown or to how many phases of construction it has extended in a very short period.

"One of the most important steps it has taken is that of welding pipe joints for high and low-pressure steam and for water and gas service in all types of buildings where extensive piping systems are used.

"Oxyacetylene welding is gaining headway in this field principally because of the marked superiority of a welded joint over a mechanical joint, thus insuring a greater freedom from leakage and adding greatly to the life of the installation. The welded system also gives greater efficiency because of better circulation, and has the added advantages of economy of space and of better appearance.

"The foregoing advantages being almost immediately obvious, the most natural question in the contractor's mind is that of comparative costs. It is safe to say that for any but the smaller sizes of pipe the cost of welded joints is less than that of mechanical joints, and the economy is greater as the size of pipe increases. Aside from the actual economy of welding, if the installations are compared joint for joint, the elimination of heavy and expensive fittings, the ease with which pipe can be cut and joined as desired, and the excellence of the job when completed are all factors in favor of welded pipe joints.

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## Death of Walter J. Kline

The many friends of Walter J. Kline, director and officer of American District Steam Company, and vice-president of the Northeastern Piping and Construction Corporation, both of North Tonawanda, N. Y., will be shocked to learn of his unexpected death, November 17, at his home in Lockport. Mr. Kline had been suffering from a carbuncle on the back of his neck, but his condition was not considered serious until shortly before his death. He was 53 years old.

The Late Walter J. Kline

Mr. Kline was a native of Lewiston, N. Y. He was a graduate of Cornell University where he studied mechanical engineering. Shortly after completing his studies there, he entered the employ of the Holly Manufacturing Company, Engineering Department, under Mr. Decrow, chief engineer. Many of Mr. Kline's suggestions in connection with the design and manufacture of water-pumping machinery were adopted and are now in use.

In 1900, Mr. Kline entered the employ of the American District Steam Company, then located in Lockport, N. Y., in its engineering department. His ability at once became apparent and he was placed in charge of the construction of the district steam heating system in Cumberland, Md. For the following several years he had charge of the company's construction work in all parts of the United States and Canada. Mr. Kline made friends easily and was soon advanced to the contract sales department, which position he filled most creditably up to the time of his death. His territory covered the eastern part of the country where he had a host of friends.

While at Cornell, Mr. Kline excelled in athletics and was a prominent football player. He was also keenly interested in golf, and was a familiar figure at the golf meets of the National District Heating Association. He was a member of the Lockport Town and Country Club and also the Tuscarora Club. His fraternal connections included the Niagara Lodge No. 375 F. and A.M. He was devoted to Masonry and was a Shriner.

In addition to his other business connections Mr. Kline was a director and vice-president of the Canadian District Steam Company, Ltd. He was registered with the University of New York as a professional engineer. He leaves a wife, two sisters and one brother.

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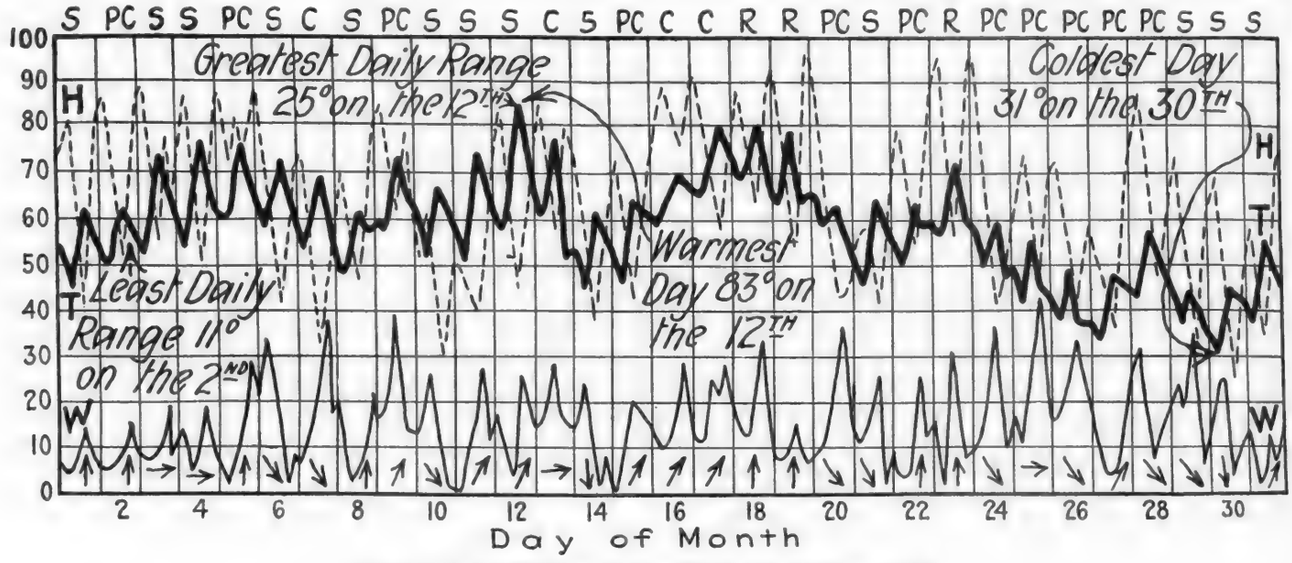
## Contractors Organize in North Carolina

J. V. Dermott, of the Dermott Heating Company, was elected president of the Associated Plumbing and Heating Contractors of Durham, N. C., recently organized in that city. The association has employed E. T. Amos as full-time executive secretary and has established headquarters in the Washington Duke Hotel.

George McCracken, of the Durham Plumbing Company, was elected vice president, and W. H. Rowe, of the Carolina Heating and Engineering Company, was made secretary-treasurer.

# The Weather for October, 1928

| | New York | Boston | Pittsburgh | Chicago | St. Louis |
|---|---|---|---|---|---|
| Highest temperature, degrees F | 80 | 88 | 83 | 87 | 88 |
| Date of highest temperature | 18 | 12 | 12 | 11 | 12 |
| Lowest temperature, degrees F | 31 | 28 | 32 | 30 | 37 |
| Date of lowest temperature | 30 | 30 | 30 | 29 | 29 |
| Greatest daily range, degrees F | 25 | 35 | 34 | 30 | 27 |
| Date of greatest daily range | 12 | 12 | 8 | 10 | 23 |
| Least daily range, degrees F | 11 | 13 | 6 | 5 | 8 |
| Date of least daily range | 2 | 19 | 29 | 18 | 16 |
| Mean temperature for month, degrees F | 58 | 57 | 57 | 56 | 62 |
| Normal mean temp. for month, degrees F | 56 | 54 | 56 | 54 | 59 |
| Total precipitation, this month, inches | 1.27 | 2.88 | 1.21 | 2.74 | 2.24 |
| Total snowfall, this month, inches | Trace | Trace | Trace | 0 | 0 |
| Normal precipitation, this month, inches | 3.53 | 3.15 | 2.52 | 2.53 | 2.72 |
| Total wind movement, this month, miles | 10673 | 6005 | 6578 | 7057 | 8074 |
| Average hourly wind velocity, miles | 14.3 | 8.1 | 8.8 | 9.5 | 10.9 |
| Prevailing direction of wind | S.W. | S.W. | S.W. | S. | S. |
| Number of clear days | 13 | 15 | 7 | 11 | 17 |
| Number of partly cloudy days | 15 | 10 | 10 | 4 | 5 |
| Number of cloudy days | 3 | 6 | 14 | 16 | 9 |
| Number of days with precipitation | 5 | 7 | 9 | 12 | 10 |
| Number of days with snowfall | 1 | 1 | 1 | 0 | 0 |
| Snow on ground at end of month | None | None | None | None | None |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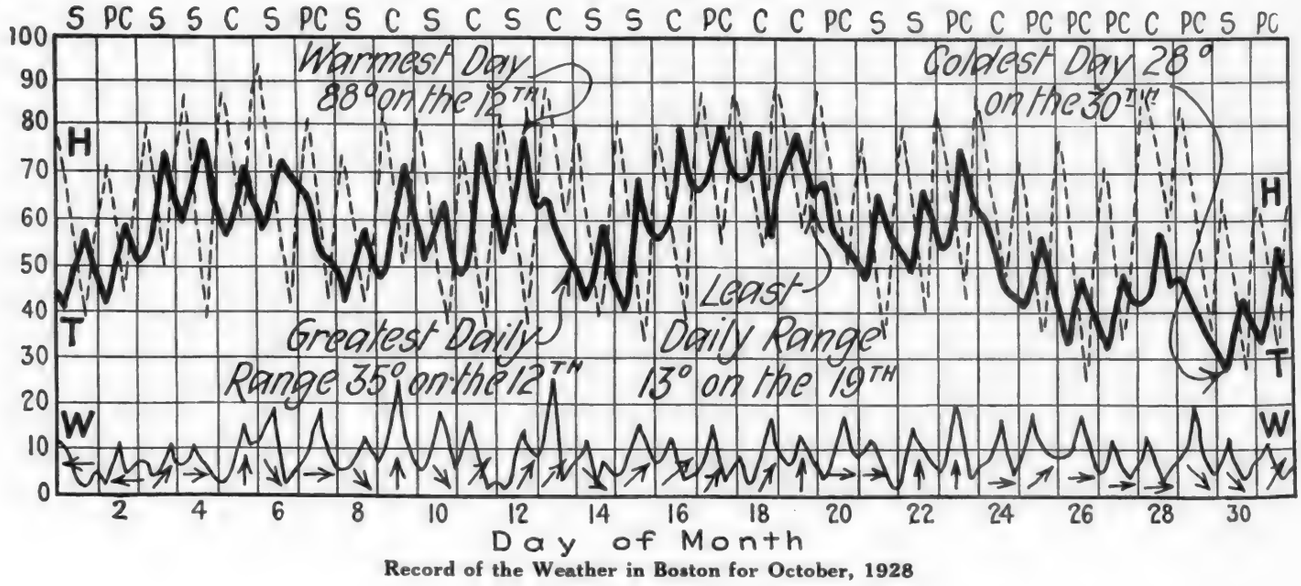
**Record of the Weather in New York for October, 1928**
(Hourly Observations of the Relative Humidity Plotted on this Chart)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Coldest Day 28° on the 30TH
Least Daily Range 13° on the 19TH
Greatest Daily Range 35° on the 12TH
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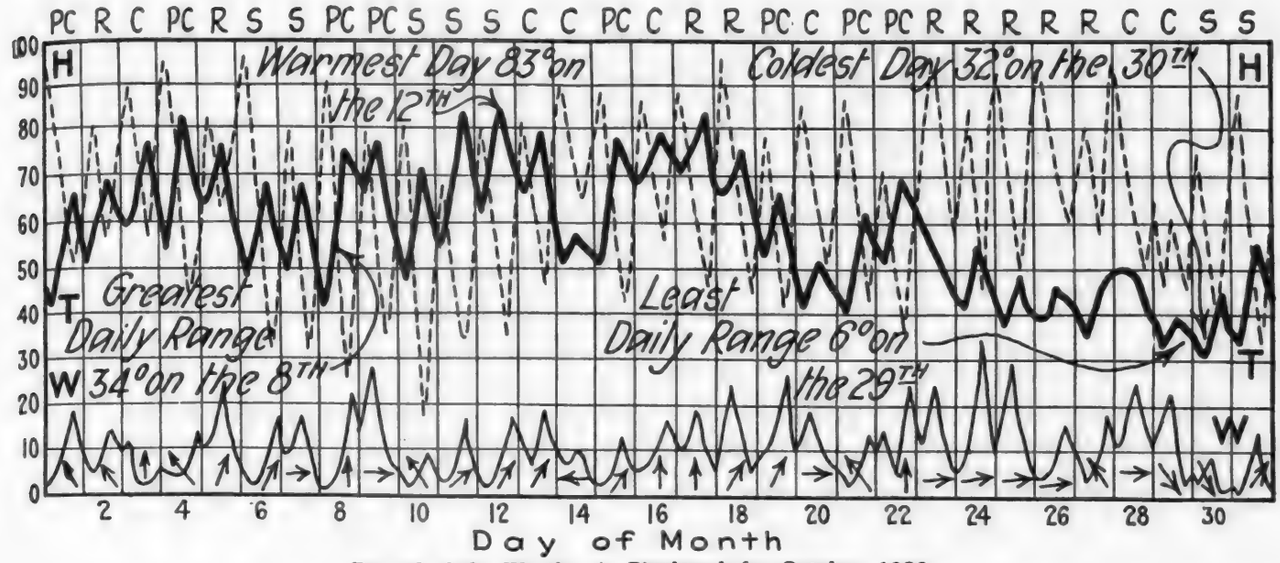
**Record of the Weather in Boston for October, 1928**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Warmest Day 83° on the 12TH
Coldest Day 32° on the 30TH
Greatest Daily Range 34° on the 8TH
Least Daily Range 6° on the 29TH
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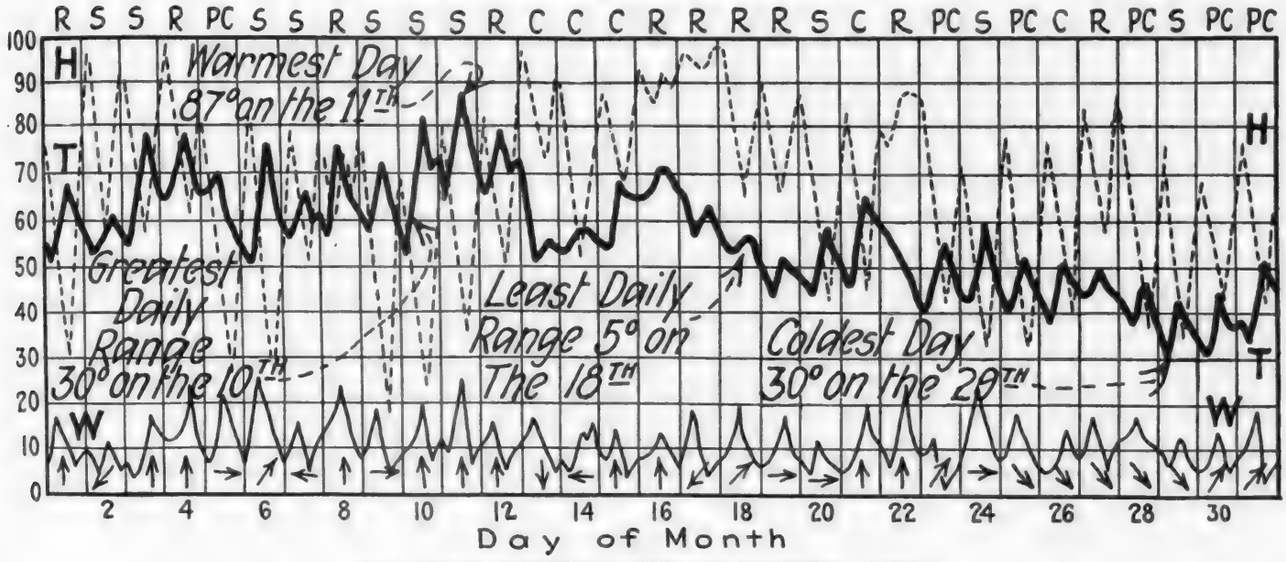
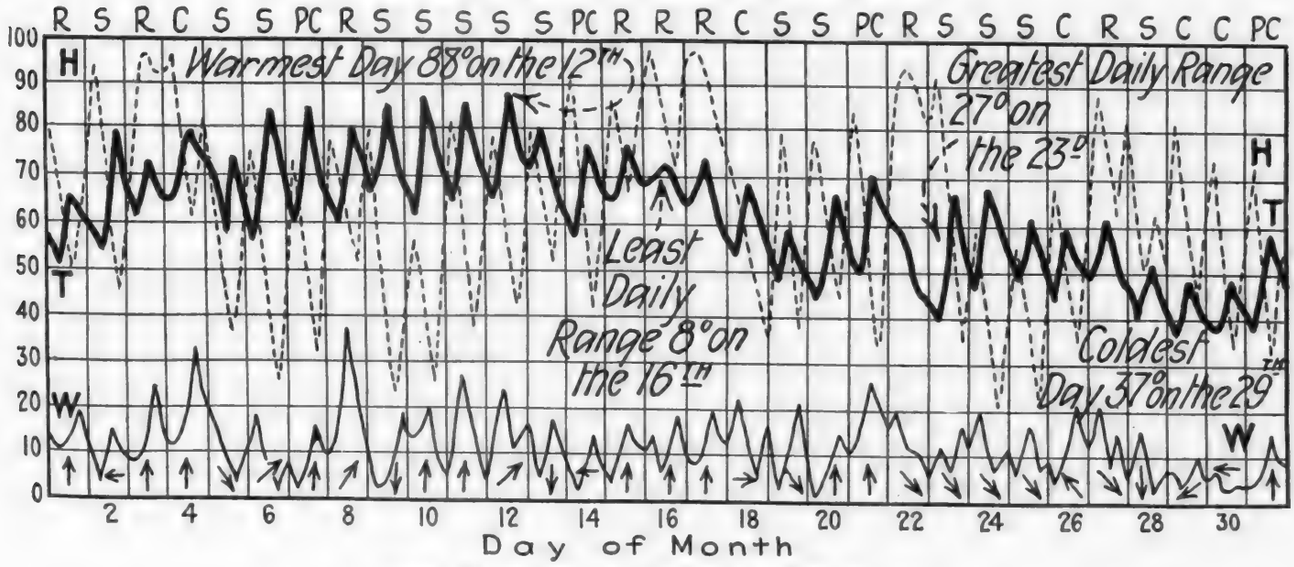
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

**Record of the Weather in Pittsburgh for October, 1928**


R S S R PC S S R S S S R C C C R R R R S C R PC S PC C R PC S PC PC
H
T
W
Warmest Day 87° on the 11TH
Greatest Daily Range 30° on the 10TH
Least Daily Range 5° on The 18TH
Coldest Day 30° on the 29TH
100 90 80 70 60 50 40 30 20 10 0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

**Record of the Weather in Chicago for October, 1928**


R S R C S S PC R S S S S S PC R R R C S S PC R S S S C R S C C PC
H
T
W
Warmest Day 88° on the 12TH
Greatest Daily Range 27° on the 23D
Least Daily Range 8° on the 16TH
Coldest Day 37° on the 29TH
100 90 80 70 60 50 40 30 20 10 0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

**Record of the Weather in St. Louis for October, 1928**

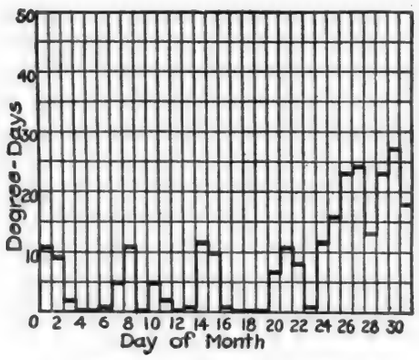
Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE by the United States Weather Bureau.
Heavy lines indicate temperatures in degree F. Light lines indicate wind in miles per hour.
Broken lines indicate humidity in percentage from readings at 8 A.M., 12 M., and 8 P.M. Arrows fly with prevailing directions of wind.
C—clear, PC—partly cloudy, C—cloudy, R—rain, Sn—snow.

# Monthly Heating Load in Degree-Days in Nine Typical Cities

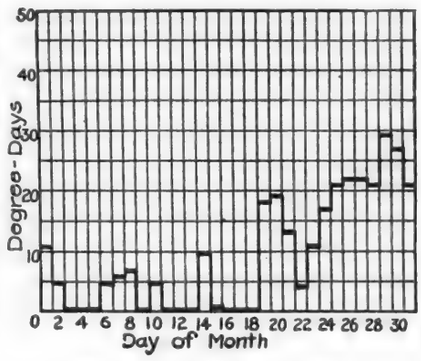
IN order that the degree-day charts may be available for all parts of the country, THE HEATING AND VENTILATING MAGAZINE will publish the heating loads and degree-days for three more cities starting with this issue. These cities are: San Francisco, Calif.; Seattle, Wash., and Denver, Colo., making a total of nine cities covering representative sections of the country.

These graphs can be pasted together so that at the end of the season, the annual heating load is presented in such form as to show the monthly heating demand at a glance. This material is of value to heating contractors, heating appliance salesmen, house-heating manufacturers of gas companies and others interested in fuel consumption.

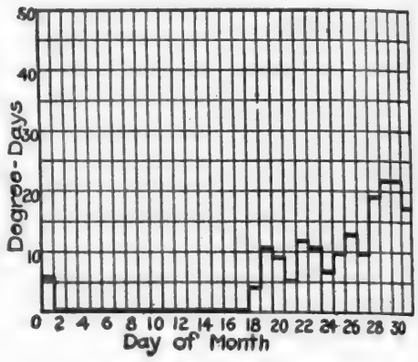
The number of degree-days per day is found by subtracting the average daily outside temperature from 65°. Thus when the average outside temperature is 62°, there are three degree-days for that day.



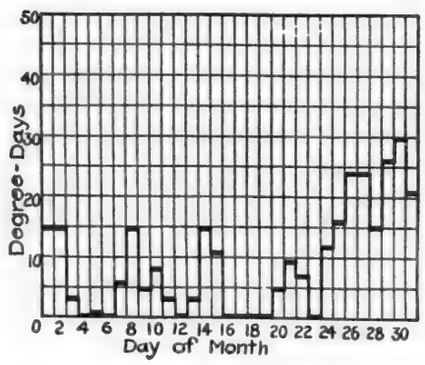

**New York, October, 1928**
Degree-Days 253—Degree-Days to Date 360



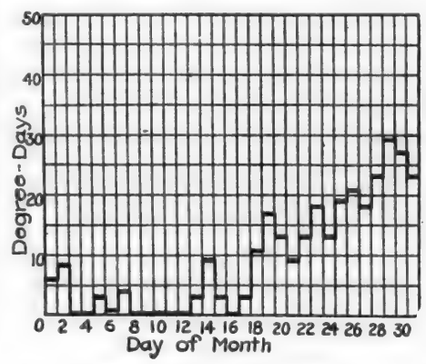

**Pittsburgh, October, 1928**
Degree-Days 285—Degree-Days to Date 462



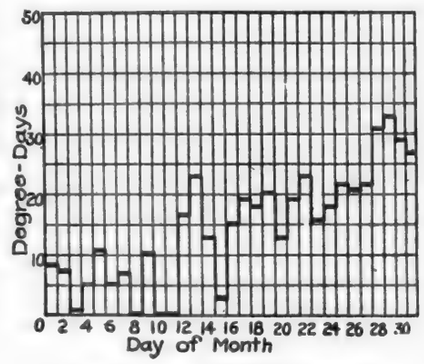

**St. Louis, October, 1928**
Degree-Days 178—Degree-Days to Date 250



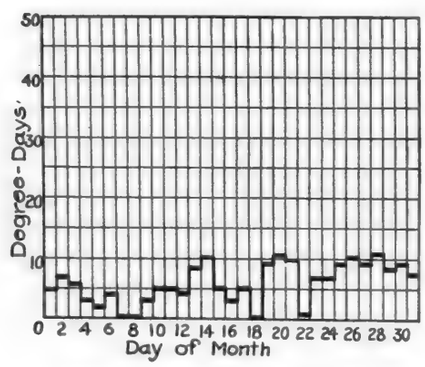

**Boston, October, 1928**
Degree-Days 289—Degree-Days to Date 416



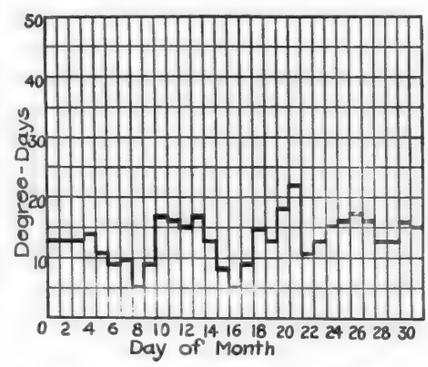

**Chicago, October, 1928**
Degree-Days 294—Degree-Days to Date 471



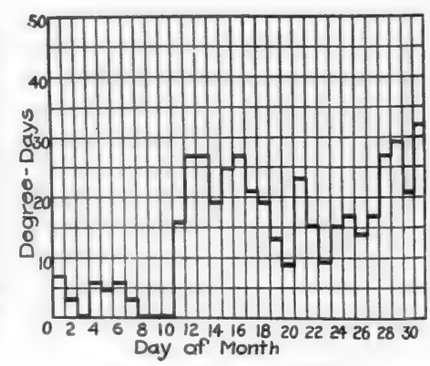

**Minneapolis, October, 1928**
Degree-Days 456—Degree-Days to Date 673




**San Francisco, October, 1928**
Degree-Days 183—Degree-Days to Date 347




**Seattle, October, 1928**
Degree-Days 410—Degree-Days to Date 613




**Denver, October, 1928**
Degree-Days 452—Degree-Days to Date 573

# Present Practice in Vapor Heating

## 17. The Marsh System

A FEATURE of the Marsh Hilo vapor system is that this system can be run under pressure without operating the air line pump, or can be run on high vacuum—in other words, to meet the outside weather conditions. In one sense the Marsh system is either a vapor or vacuum system all in one.

In a general way the system consists of the Hilo trap on the radiator and the Hilo governor on the pump, in conjunction with the Influx radiator valves, ounce graduated gauges, damper regulator and other basement specialties. The piping is the same as on the standard vapor job. The extra cost of this system is very small.

### System Can be Operated Under Either Low-Pressure or Vacuum

By referring to the schematic drawing, it will be seen that the arrangement is unusual. The system can be operated at any pressure. Assuming 2 lbs. pressure, the water will be returned to the boiler through the return trap. It can be run as a low-pressure vapor system at 4 to 8 oz. pressure and the water will be returned to the boiler by gravity. To this extent it does not differ from the standard job. However, with the special application of the Marsh air line pump, the Hilo governor and the Hilo trap, the system can be run under either high or low vacuum.

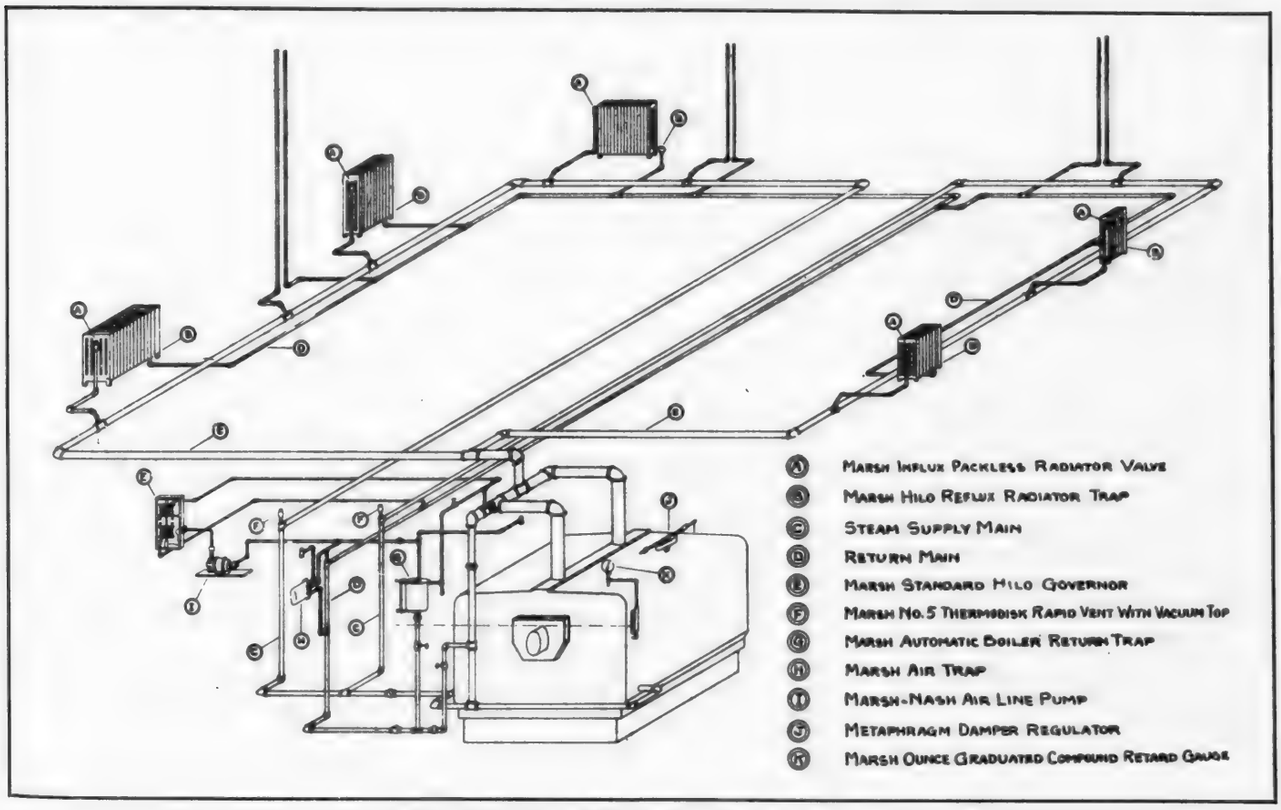
Previous articles in this series are:

1. *Webster Type R Modulation System, August*, 1926.
2. *Dunham Home Heating System, August*, 1926.
3. *The Illinois System, September*, 1926.
4. *Hoffman Controlled Heat, September*, 1926.
5. *The Mouat System, October*, 1926.
6. *The Trane System, November*, 1926.
7. *The Sarco System, December*, 1926.
8. *The O-E Perfect 3-in-1 System, January*, 1927.
9. *The Gorton System, February*, 1927.
10. *The Barclay System, May*, 1927.
11. *The Richardson System, June*, 1927.
12. *The Barnes & Jones System, July*, 1927.
13. *The Broomell System, November*, 1927.
14. *The Hutchison System, May*, 1928.
15. *The Veco System, August*, 1928.
16. *The Adsco System, October*, 1928.

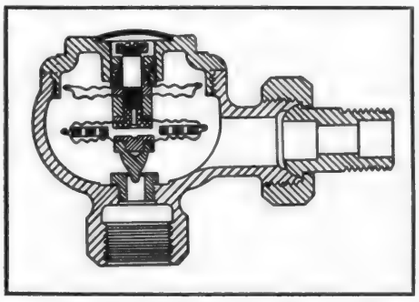
Under vacuum conditions the air line pump holds the vacuum in the main circuit and in the boiler as described later under the heading of the standard Hilo governor. The governor controlling the pump operates at 2 in. of vacuum ahead of the boiler under all conditions. The cycle of operation in returning the water to the boiler under vacuum conditions is entirely based on the unusual arrangement and its relations to the return trap.

### Description of Method of Operation

Under pressure, it has already been indicated that the return trap returns the water to the boiler by equalizing the pressure. Under vacuum the return trap returns the water by equalizing the vacuum. Under equalized vacuum, the water will flow the same as it will under equalized pressure. Therefore, the return trap performs a necessary function both under pressure and vacuum conditions. When the float in the trap is raised by the water of condensation accumulating in the system, it opens the inlet valve, closes the exhaust valve, and equalizes through the pipe connection at the boiler either under pressure


A MARSH INFLUX PACKLESS RADIATOR VALVE
B MARSH HILO REFLUX RADIATOR TRAP
C STEAM SUPPLY MAIN
D RETURN MAIN
E MARSH STANDARD HILO GOVERNOR
F MARSH NO. 5 THERMODISK RAPID VENT WITH VACUUM TOP
G MARSH AUTOMATIC BOILER RETURN TRAP
H MARSH AIR TRAP
I MARSH-NASH AIR LINE PUMP
J METAPHRAGM DAMPER REGULATOR
K MARSH OUNCE GRADUATED COMPOUND RETARD GAUGE

**Typical Layout of Marsh Vapor Heating System**

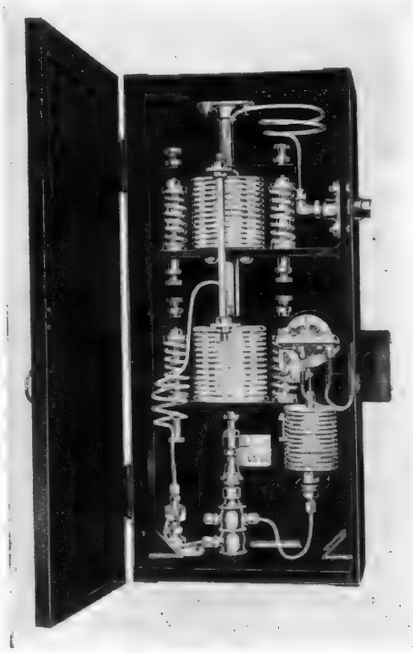


Marsh Hilo Radiator Trap

or vacuum. Assuming 10 in. vacuum, the water in the system goes through two cycles—the first being from the air separating trap into the return trap and then from the return trap into the boiler. It is only under vacuum conditions that the water goes through the two cycles. By following the operation in the layout, it will be noted that there is covered every phase of operation which would be required on a vapor job operating from pressure down into a vacuum. It will be noted that the air discharges from the air trap while under pressure and from the pump while under vacuum.

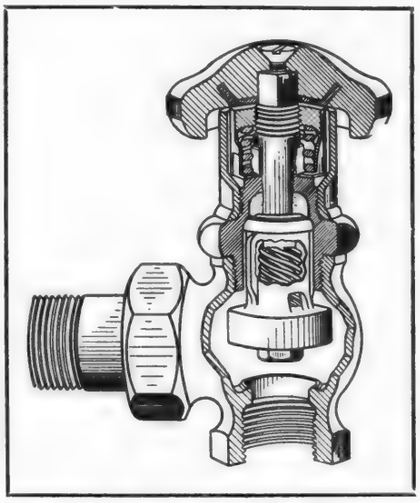
### Marsh Hilo Traps

Inspection of the cross-section view will illustrate the internal arrangement of the trap. The upper diaphragm is open to atmosphere and is not loaded with any volatile fluid or other expansive medium—merely open to atmosphere and filled with air. The function of this diaphragm is automatically to set the thermostatic diaphragm in proper adjustment, depending upon the conditions under which the thermostatic diaphragm is operated.



Marsh Hilo Governor

When the thermostatic diaphragm containing the volatile fluid is operated under pressure from atmospheric pressures up, it is in standard setting and is so adjusted at the factory under steam temperatures. However, when the thermostatic diaphragm is operated under vacuum conditions the entire diaphragm moves vertically, expanding under vacuum and automatically adjusting the thermostatic diaphragm in the proper relation to the seat. The greater the vacuum in the system and the lower the temperature at which vapor is produced, the closer the diaphragm valve is placed to the seat.



Marsh Influx Radiator Valve

The advantage of this construction is that the trap is sensitive and will maintain a fixed water line in the radiator. The fact that heat emission of the radiators under vacuum conditions is only 70% of that when the steam is under pressure makes this system flexible under moderate temperature conditions ranging from 30° F. to 40° F. above zero.

### Marsh Standard Hilo Governor

The Marsh standard Hilo governor is designed to control the pump 2 in. of vacuum ahead of the boiler, or at any differential which may be selected. Referring to the illustration of the standard Hilo governor, it will be noted that the upper bellows is connected to the boiler header or water column, or, in fact, any connection which communicates with the interior of the boiler. The lower bellows is connected to the vacuum return close to the vacuum pump. This lower bellows controls the Merkustat mercury-to-mercury switch which, in turn, operates the magnetic switch on the pump. When the boiler is at any pressure from atmosphere up, the pump will be in standard setting of 2 in. vacuum on and 6 in. vacuum off, but when the boiler is operating under vacuum conditions then the pump up to its capacity is maintained 2 in. ahead of the system. Thus, circulation of vapor is assured at a low temperature.

The Marsh Hilo vapor system is adaptable for installation in medium-sized buildings such as apartment houses, small hotels, etc., as well as for the smaller type of job.

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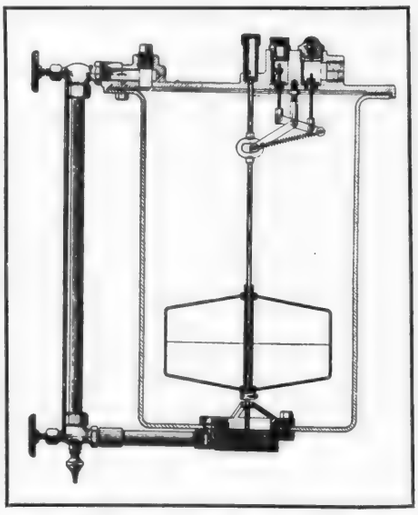
## Underfloor Water Heating System for English Schools

A system of underfloor heating in the Derbyshire schools, in England, was described by Dr. H. M. Vernon in a paper on "Methods of Heating and Ventilating Schools and Their Influence on Health," presented before the (British) Institution of Heating and Ventilating Engineers in London, October 9.

The design provided for low-pressure hot-water pipes 2 in. in diameter supported 2 in. above the level of an underfloor of concrete, which is 6 in. in thickness. Three inches above the pipes comes the actual floor, consisting of slabs of concrete ⅞ in. thick and 27 in. wide. Each slab is strengthened by three ribs underneath, and its edges rest on porous bricks. On the top is a layer of composition "granwood" tiles, ⅝ in. thick, embedded in cement. The underfloor pipes, which are 16 in. apart, are supplied from a 3½ in. pipe which runs horizontally along one or two walls of each classroom, at a height of 7¼ ft. above the floor. This underfloor heating maintained the floor at a temperature of 63° to 76°, and the air at head level was 2° cooler than that at foot level (6 in. above the floor), and 19° cooler than the floor surface.



Marsh Boiler Return Trap

## CAPACITIES OF GAS PIPE

### TABLE I

**Laterals and Service Pipes**

Showing Capacity of Pipe of Different Diameters and Lengths in Cubic Feet per Hour with Pressure Drop of 0.2 In. and Specific Gravity 0.60

| Length of Pipe, Ft. | Diameter of Pipe, In. ¾ | 1 | 1¼ | 1½ | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|
| 15 | 168 | 350 | 620 | 960 | 2000 | 5400 | 11200 |
| 30 | 120 | 245 | 430 | 680 | 1400 | 3800 | 7900 |
| 45 | 98 | 200 | 355 | 530 | 1150 | 3200 | 6500 |
| 60 | 84 | 175 | 310 | 480 | 1000 | 2700 | 5600 |
| 75 | 76 | 155 | 275 | 430 | 890 | 2450 | 5000 |
| 90 | 70 | 145 | 250 | 395 | 810 | 2260 | 4550 |
| 105 | 64 | 132 | 232 | 370 | 750 | 2100 | 4200 |
| 120 | 60 | 125 | 215 | 340 | 700 | 1950 | 4000 |
| 150 | 54 | 110 | 195 | 310 | 630 | 1750 | 3550 |
| 180 | 49 | 100 | 175 | 280 | 570 | 1600 | 3200 |
| 210 | 44 | 94 | 165 | 260 | 530 | 1450 | 3000 |
| 240 | 43 | 88 | 155 | 240 | 500 | 1350 | 2800 |
| 270 | 40 | 83 | 145 | 230 | 470 | 1300 | 2650 |
| 300 | 38 | 79 | 138 | 215 | 440 | 1250 | 2500 |
| 450 | 31 | 64 | 112 | 176 | 360 | 1000 | 2050 |
| 600 | 27 | 56 | 97 | 152 | 315 | 860 | 1750 |

### TABLE II

**Verticals and Risers**

Showing Capacity of Pipe of Different Diameters and Lengths in Cubic Feet per Hour with Pressure Drop of 0.5 In. and Specific Gravity 0.60

| Length of Pipe, Ft. | Diameter of Pipe, In. ¾ | 1 | 1¼ | 1½ | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|
| 15 | 270 | 560 | 980 | 1540 | 3200 | 8600 | 17800 | 31000 |
| 30 | 190 | 390 | 680 | 1080 | 2200 | 6100 | 12500 | 22000 |
| 45 | 155 | 320 | 560 | 890 | 1800 | 5000 | 10300 | 18000 |
| 60 | 135 | 280 | 490 | 770 | 1600 | 4300 | 8900 | 15500 |
| 75 | 120 | 250 | 430 | 680 | 1400 | 3800 | 8000 | 14000 |
| 90 | 110 | 230 | 400 | 620 | 1300 | 3500 | 7300 | 12500 |
| 105 | 102 | 210 | 370 | 580 | 1200 | 3300 | 6800 | 11800 |
| 120 | 96 | 200 | 345 | 545 | 1100 | 3100 | 6300 | 11000 |
| 150 | 87 | 180 | 310 | 490 | 1000 | 2700 | 5600 | 9800 |
| 180 | 79 | 160 | 280 | 445 | 900 | 2500 | 5100 | 8900 |
| 210 | 73 | 150 | 260 | 410 | 840 | 2300 | 4800 | 8300 |
| 240 | 68 | 140 | 245 | 385 | 790 | 2150 | 4400 | 7700 |
| 270 | 65 | 130 | 230 | 365 | 740 | 2050 | 4200 | 7300 |
| 300 | 61 | 125 | 220 | 345 | 710 | 1950 | 4000 | 7000 |
| 450 | 50 | 100 | 180 | 280 | 570 | 1600 | 3200 | 5600 |
| 600 | 43 | 88 | 150 | 240 | 490 | 1350 | 2800 | 4800 |

Courtesy of American Gas Association.



## HEATING VALUES AND CHARACTERISTICS OF VARIOUS GASES AND PRODUCTS OF COMBUSTION

| Gas | Constituents of Gas—% by Volume CO | $CO_2$ | $H_2$ | $N_2$ | $O_2$ | $CH_4$ | $C_2H_4$ Illuminants | Specific Gravity Air = 1.000 | Cu. Ft. of Air Theoretically Required for Combustion of 1 Cu. Ft. of Gas | B.T.U. per Cu. Ft. Gross | B.T.U. per Cu. Ft. Net | Products of Combustion per Cu. Ft. of Gas $CO_2$ | $H_2O$ | $N_2$ | Ultimate $CO_2$ % | Net B.T.U. per Cu. Ft. of the Products of Combustion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Natural Gas Texarkana | .... | 0.80 | .... | 3.20 | .... | 96.00 | ..... | .... | 0.57 | 9.17 | 967 | 873 | .97 | 1.92 | 7.29 | 11.7 | 80.2 |
| Natural Gas Cleveland | .... | .... | .... | 1.30 | .... | 80.50 | 18.20 | .... | 0.65 | 10.70 | 1131 | 1025 | 1.17 | 2.16 | 8.50 | 12.1 | 81.1 |
| Natural Gas Oil City, Pa. | .... | .... | .... | 1.10 | .... | 67.60 | 31.30 | .... | 0.71 | 11.70 | 1232 | 1120 | 1.30 | 2.29 | 9.26 | 12.3 | 81.7 |
| Retort Coal Gas (Horizontal) | 8.6 | 1.5 | 52.5 | 3.5 | 0.3 | 31.4 | ..... | 2.2 | 0.42 | 5.00 | 575 | 510 | .50 | 1.21 | 3.99 | 11.2 | 83.5 |
| Coke Oven Gas | 6.3 | 1.8 | 53.0 | 3.4 | 0.2 | 31.6 | ..... | 3.7 | 0.42 | 5.19 | 588 | 521 | .51 | 1.25 | 4.13 | 11.0 | 82.7 |
| Coke Oven Gas Koppers Ovens | 6.8 | 2.2 | 47.3 | 6.0 | 0.3 | 33.9 | ..... | 3.5 | 0.44 | 5.23 | 591 | 525 | .54 | 1.23 | 4.19 | 11.4 | 82.3 |
| Carburetted Water Gas | 33.4 | 3.9 | 34.6 | 7.9 | 0.9 | 10.4 | ..... | 8.9 | 0.65 | 4.37 | 536 | 496 | .74 | .75 | 3.54 | 17.2 | 88.5 |
| Blue Water Gas | 42.8 | 3.0 | 49.9 | 3.3 | 0.5 | 0.5 | ..... | .... | 0.53 | 2.26 | 308 | 281 | .46 | .51 | 1.82 | 22.3 | 89.7 |
| Theoretical Water Gas | 50.0 | .... | 50.0 | .... | .... | ..... | ..... | .... | 0.52 | 2.39 | 325 | 298 | .50 | .50 | 1.89 | 20.9 | 90.3 |
| Anthracite Producer Gas | 24.0 | 7.5 | 16.5 | 50.2 | 0.6 | 1.2 | ..... | .... | 0.85 | 1.05 | 134 | 124 | .33 | .19 | 1.36 | 19.5 | 65.6 |
| Bituminous Producer Gas | 27.0 | 4.5 | 14.0 | 50.9 | 0.6 | 3.0 | ..... | .... | 0.86 | 1.24 | 150 | 140 | .35 | .19 | 1.49 | 19.0 | 69.2 |
| Blast Furnace Gas | 27.5 | 10.0 | 3.0 | 58.0 | 1.0 | 0.5 | ..... | .... | 1.00 | 0.78 | 102 | 100 | .38 | .04 | 1.21 | 23.9 | 61.0 |
| Oil Gas (Protero 1920) | 6.8 | 1.0 | 59.2 | 2.7 | 0.1 | 25.4 | ..... | 4.8 | 0.35 | 4.91 | 575 | 510 | .47 | 1.21 | 3.91 | 10.7 | 84.2 |

From "House Heating," published by American Gas Association.

**Original Plant of Buffalo Forge Company in 1883**

# Glancing Backward

## High Lights in the Evolution of Leaders in the Heating and Ventilating Industry

### *X—Buffalo Forge Company*

BACK in 1878, Charles F. Brunke and Charles Hammelman, partners, began the manufacture of a portable forge originated by Mr. Hammelman. After a year of disappointments, the two partners sold a half interest in this apparently hopeless business to W. F. Wendt, then a bookkeeper in his early twenties. The first little shop was located on the fifth floor of a very humble building at Washington and Perry Sts., Buffalo, N. Y. This was the beginning of the Buffalo Forge Company.

#### Chief Products of Company in Early Days Were Blacksmiths' Forges

Up until that time practically all the forges made in this country were operated by bellows. Several companies had tried to market forges with blowers without success. With new ideas and much energy the little forge concern soon began to make rapid strides. The company was at first forced to have outside machine shops make their products, but by 1880 the business was sufficient to warrant the purchase of their own manufacturing plant. The location selected was a frame building on Broadway near Mortimer—the present location. Mr. Wendt would spend several weeks manufacturing a dozen forges and then switching from factory hand to salesman, go out on the road and sell them. The original forge had become so popular that the blower was separated from the forge and sold to blacksmiths who already had a brick forge. New and varied styles of forges and blowers gradually were added to meet the requirements of the blacksmiths, railroads, and shops of all kinds.

In 1881, the company was included among the few other American manufacturers who had contributed toward the expense of sending a single representative to Australia to introduce their machinery. The representative found English and German products the dominating machinery, with American equipment unknown. The forges were clumsy bellows type manufactured by an English concern.

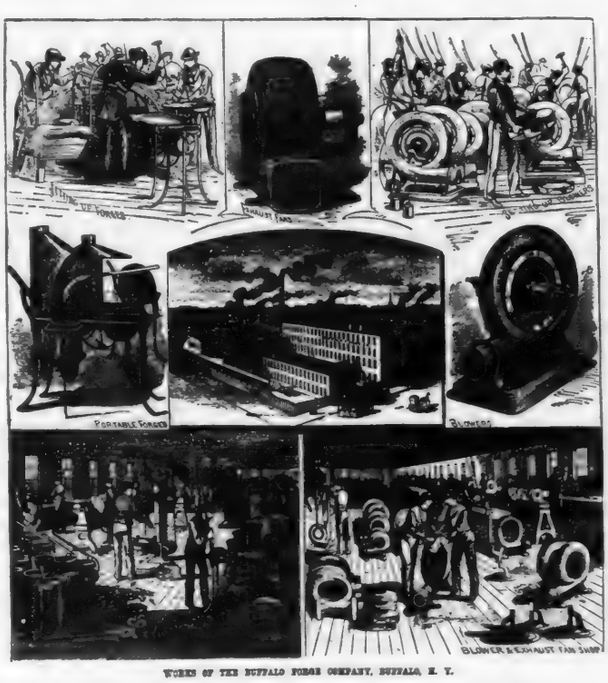
**H. W. Wendt**

After receiving this information the Buffalo Forge Company sent several free samples of Buffalo forges to each port of call.

At the end of three years the representative returned without any orders, but during that time the sample forges were used and found superior to the ones that had been used. The result is that most of the blacksmith tools used in Australia today have the trademark "Buffalo." The same success was attained in South America, India, and other countries.

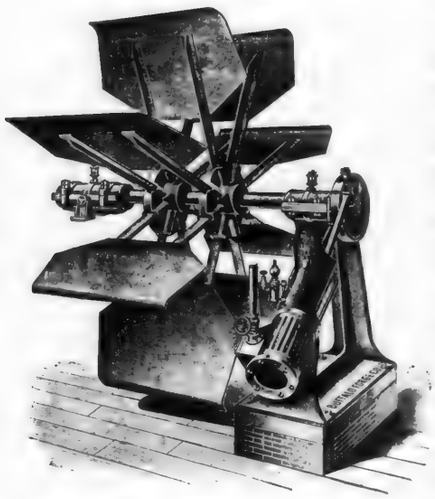
In the year 1884, the company entered the heating and ventilating field. The new field proved just as lucrative as the forge business, and today heating and ventilating equipment constitutes the greater part of the factory's output.

In 1888, Henry W. Wendt, a brother of W. F. Wendt, was admitted to the firm. H. W. Wendt was the traveler and closed most of the large orders. The old Auditorium Theatre, Chicago, a relic of World's Fair days, but still one of the largest theatres in this country,




WORKS OF THE BUFFALO FORGE COMPANY, BUFFALO, N. Y.

**An Old Advertising Cut, Showing the Use of Buffalo Forge Fans with Blacksmiths' Forges**



**Steam-Engine Driven Fan Used About 1885**

bears the stamp of his engineering. This is believed to be the first downward ventilation system used in a theatre.

In those early days the railroads were good customers for forge shop equipment, and while returning one night from the Big Four Shops at Indianapolis, H. W. Wendt conceived the idea of the down-draft forge. This down-draft design became popular throughout the industrial world, and over 95% of the forge shops maintained in training schools in this country are still using this type of forge.

### Export Business Grows and Canadian Subsidiary Formed

In 1900, the company bought all the ground available adjoining their small plant and built a substantial factory provided with a foundry, pattern shop, machine shop and storage building. With the foreign market well established, export business continued to grow. Branch offices were established in the principal cities of the United States, and the Canadian Blower & Forge Company established about this time, took care of the Canadian business.

In 1903, the George L. Squier Manufacturing Company and the Buffalo Steam Pump Company were acquired. The former concern was better known in South American countries than in the United States, and excelled in the manufacture of machinery for sugar, rice and coffee plantations. Recently the Squier Company built two large plants, one at San Miguel, Porto Rico, and one at La Paila, Colombia, South America. The Buffalo Steam Pump Company was well established as manufacturers of steam and centrifugal pumps when taken over by the Buffalo Forge Company. The main factory of this concern is located in North Tonawanda, N. Y.

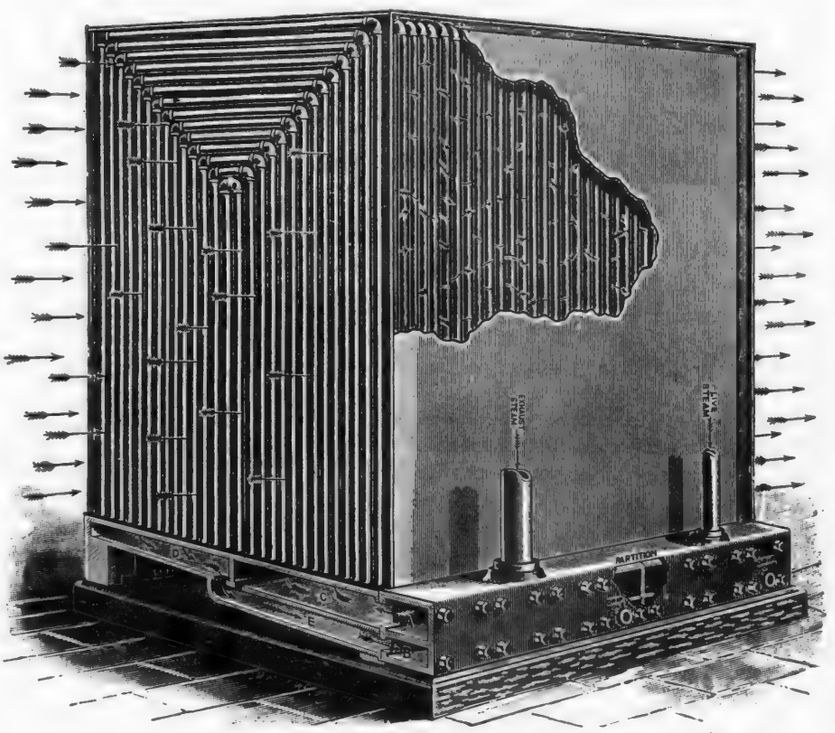
With the three companies under their control, the business of the Buffalo Forge Company continued to grow, and, in 1905, it was incorporated at $1,500,000. In 1914 the three plants afforded employment to 1500 factory hands, the greater portion of whom were skilled mechanics. The executive, sales, engineering and office force at that time numbered close to 300.

One of the first developments made by the company was the Niagara Conoidal fan, each individual blade of which was a section of a conical surface, thus providing an even volume and pressure over the whole width of the housing. The Buffalo Forge Company also originated, and hold patents, on double curved-blade fans developed from cylindrical and conical surfaces. These blades are backward curved and provide a rising pressure characteristic and flat horsepower curve which is advantageous to the average ventilating installation. The Duplex Conoidal and Turbo Conoidal fans have this type of blade.

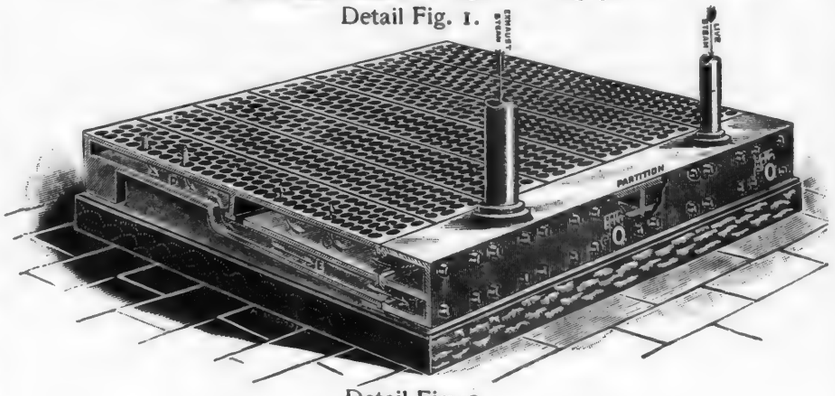
### Expanded Scroll Housings Originated by Buffalo Forge Company

The Buffalo Forge Company also were originators of expanded scroll housings, the purpose of which was to gradually reduce the velocity of the air leaving the wheel as the air approaches the fan outlet. This is in accordance with the theory of the free vortex and produces a greater conversion into static pressure at the fan outlet than if the velocity of the air were reduced suddenly.

Direction vanes in fan inlets were originated by this company and have been used for the past ten years. It is possible with these vanes to furnish fans with non-overloading horsepower

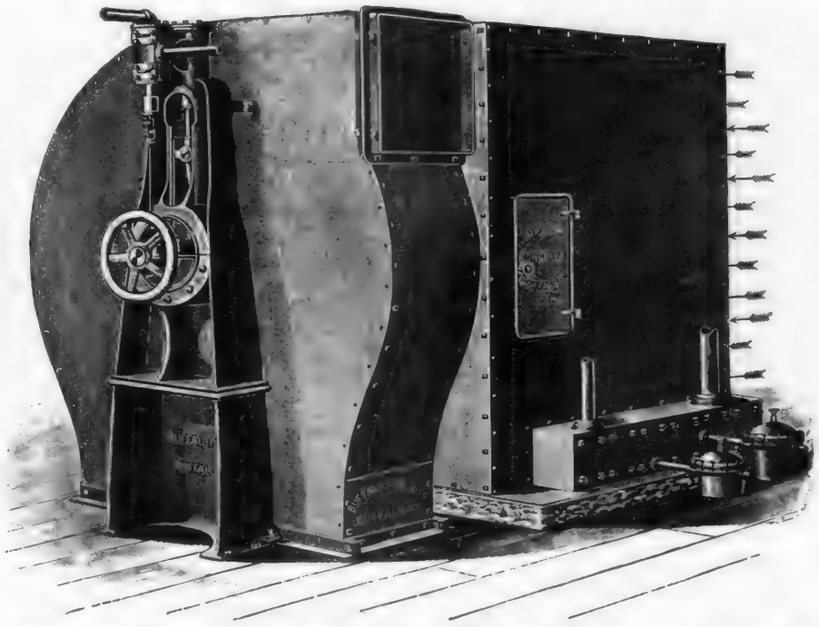



Detail Fig. 1.




Detail Fig. 2.

**Fan-Blast Pipe Coil Heater Design of the Early Nineties**

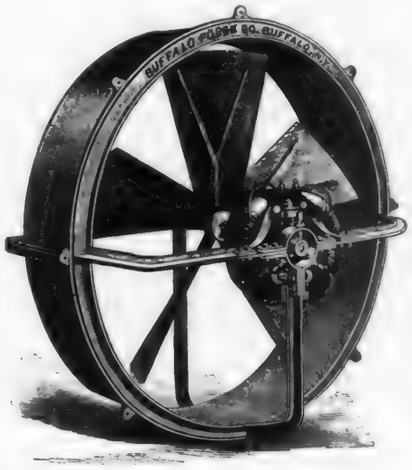


**Heating and Ventilating Apparatus of 1885. Note the Small Outlet on the Fan in Comparison with Modern Practice**

characteristics regardless of the actual operating conditions of the system.

For a good many years, Willis H. Carrier was chief engineer for the company. He originated and developed the idea of washing air with water sprays. This was the forerunner of all the present-day development and almost universal use of this type of equipment for air washing and air conditioning in the heating and ventilating field.

In the early part of 1916, W. F. Wendt sold his entire interest to his brother, and the company was then reorganized and the following officers elected, all of whom are still acting: H. W. Wendt, president; E. F. Wendt, vice-president and treasurer; H. W. Wendt, Jr., vice-president and secretary; C. A. Booth, vice-president and sales manager; H. S. Whiting, assistant secretary.




**Used About 1890, This Is One of the Earliest Motor-Driven Direct-Connected Disc-Fans**

## Laboratory to Investigate Design of Anthracite Burning Equipment

Anthracite Operators Conference has engaged the Frost Research Laboratory, Norristown, Pa., to conduct extensive research on improved methods of using anthracite in domestic heating plants. This work will involve the investigation, testing and development of apparatus for the efficient burning of anthracite, dustless removal of ashes, and the automatic control of combustion. Contact will be established with manufacturers of heating and related equipment, governmental bureaus, and scientific and trade associations for the interchange of ideas. The purpose of the service is to provide, without cost, to manufacturers, designers and inventors, adequate research facilities where tests of appliances and technical assistance on problems relating to the design of coal-burning equipment may be obtained, subject to approval by the conference committee. In this way the conference seeks to stimulate an intensive development of apparatus in this field.

## Presidents' and Secretaries' Conference

The Congress Hotel, Chicago, will be the headquarters for the seventh annual Presidents' and Secretaries' Conference held under the auspices of the Plumbing and Heating Industries Bureau, January 14-16, 1929. Over 200 officers of local and state associations of plumbing and heating contractors are expected to attend the meeting, and William G. Bergner, secretary of the bureau, has assured heating contractors and master plumbers that they also are welcome to attend. One of the principal objects of this convention will be the formation of a uniform program for all associations throughout the country. During the first day of conferences, the secretaries and presidents of heating associations will meet separately and the officers of the plumbing associations will also meet separately. Joint meetings will be held during the second and third days.

## National District Heating Association

Thirty members attended the executive and general committee meetings of the National District Heating Association at the Benjamin Franklin Hotel, Philadelphia, November 14-16. Every member of the executive committee and all but one of the committee chairmen were in attendance.

Merritt C. Huse, sales manager of the Philadelphia Electric Company, addressed the group at a luncheon. In his talk Mr. Huse outlined the responsibilities of the individual, the groups, and the association to each other and to the public. He urged the development of a "district heating consciousness" on the part of potential steam heat purchasers, and prophesied that district heating will move forward very rapidly in the future.

The executive committee accepted the cordial invitation extended by the Detroit Edison Company to hold the next annual convention of the association in Detroit, June 11-14, 1929. Formation of a sales promotional committee, composed of the foremost district heating salesmen in the country, was approved by the executive committee. D. L. Gaskill, secretary-treasurer of the association, reported that the handbook had been reprinted, and copies are now available by application to him.

## Heating Contractors Organize in San Diego

Heating contractors of San Diego, Calif., have organized a local chapter of the Heating and Piping Contractors National Association. Edward Rohde was elected president and Walter Bellon was elected secretary-treasurer. The official headquarters will be at 2926 F Street.

# Heating and Ventilating Exhibitors at National Power Show

## Grand Central Palace, New York, December 3-8, 1928

306 307 **Absolute Con-Tac-Tor Corp., Elkhart, Ind.,** mercury switches; oil burner, unit heater and coal burner controls.

271 to 274 **Advance Engineering Co., New York,** Armstrong steam traps; Cash reducing and regulating valves; Templeton boiler feed and pumping traps; Mosher steam, oil and air separators.

14a **Aerofin Corp., Newark, N. J.,** high, low, and universal pressure Aerofin, and booster coils for fan blast installations.

269 270 **Alexander Bros., Inc., Philadelphia, Pa.,** transmission belting operating on several types of equipment.

74 **Allen & Billmyre Co., New York,** multi-stage turbo-blower, two single-stage blowers.

314 315 321 322 **American Blower Co., Detroit, Mich.,** full display of fans, blowers and unit heaters; also a working model of Spray booth ventilation. (Under direction of E. B. Latham & Co., New York.)

65 **American Brass Co., Waterbury, Conn.,** brass pipe, sheets, tubes, turbine blading, bronze welding rods, piston rods.

343 **American Metal Hose Co., Waterbury, Conn.,** flexible metal hose and conduit.

564 **American Pipe Bending Machine Co., Inc., Boston, Mass.,** 3 pipe bending machines.

616 **American Pulley Co., Philadelphia, Pa.,** steel split pulleys, shaft hangers, and hand trucks.

543 544 **American Radiator Co., New York, (also Detroit Lubricator Co.)** Mercoid controls for temperature, pressure and fuel control; motor valves and solenoid valves.

660 **American Society of Heating and Ventilating Engineers, New York,** headquarters for society members; exhibits relating to problems now under investigation by its Research Laboratory.

639 640 **Ames Pump Co., Inc., New York,** vacuum heating pumps and condensate pumps.

94 **Armstrong Cork & Insulation Co., Pittsburgh, Pa.,** heat insulating material for high temperature equipment.

271 **Armstrong Machine Works, Three Rivers, Mich.,** glass model of the Armstrong steam trap operating under steam pressure, and a display of the full line of traps made by this company.

742 **Atlantic Metal Hose Co., Inc., New York,** flexible metallic hose and couplings.

552 553 **Atwood & Morrill Co., Salem, Mass.,** bleeder valves, condensate traps, relief valves, float chambers, adjustable combination regulators.

61 **Auburn Stoker Corp., Auburn, Ind.,** overfeed stoker and underfeed stoker.

432 **Badger & Sons Co., E. B., Boston, Mass.,** expansion joints and copper boilers.

14 **Ballwood Co., New York,** forged steel flanges, welded headers, flanged pipe joints, rolled and welded pipe.

312 313 **Barnes & Jones, Boston, Mass.,** modulation, vapor and vacuum heating systems; radiator, vacuum return, blast, and vent traps; steam and water modulation valves.

550 **Belfield Co., H., Philadelphia, Pa.,** valves and steam specialties, solenoid valves, brass and copper fittings.

661 **Bentz Engineering Corp., Newark, N. J.,** air-conditioning apparatus featuring "Chillblast" air conditioner, cooler and dehumidifier.

70 71 **Bethlehem Steel Co., Bethlehem, Pa.,** Bethlehem pulverizer and Bethlehem Dahl oil-burning system.

316 **Bigbie Grate & Forced Draft Equipment Co., New York,** grates; blowers for ventilating and forced draft systems.

290 **Black & Decker Mfg. Co., Towson, Md.,** portable electric tools.

54 **Boiler & Stoker Engineering Co., Inc., New York,** stokers and boilers.

12 **Bristol Co., Waterbury, Conn.,** recording pressure and vacuum gauges, recording barometers, recording liquid level tank gauges, indicating and recording gauges for steam gauges, recording thermometers, recording and indicating pyrometers, recording thermometers, temperature control instruments and control valves, and electrical control instruments.

51 **Brown Instrument Co., Philadelphia, Pa.,** electric flow meter in operation, indicating and recording thermometers, pressure gauges, resistance thermometers, flue gas pyrometers and $CO_2$ meters.

681 **Bryan Boiler Co., Greenwich, Conn.,** heating boilers.

28 **Builders Iron Foundry, Providence, R. I.,** Venturi meters, diaphragm meters, and type KS shunt meters for steam, air and gas.

429 430 **Byers Co., A. M., Pittsburgh, Pa.,** puddle ball made by new process, welded joints, samples showing fractures of joints made by both old and new systems.

529 **Carpenter and Paterson, Inc., East Boston, Mass.,** pipe hangers, adjustable brackets, radiator brackets.

14a **Carrier Engineering Corp., Newark, N. J.,** unit air conditioners, centrifugal refrigeration unit, home air conditioner, equipment for the drying and processing of materials.

273 **A. W. Cash Co., Decatur, Ill.,** pressure reducing and regulating valves.

510 511 **Century Electric Co., St. Louis, Mo.,** various types of motors.

274 **Chicago Pipethread Machine Co., Racine, Wis.,** pipe threading machinery.

43 **Connery & Co., Inc., Philadelphia, Pa.,** Connery's improved expansion stiffener; air-cooled damper, expansion stiffened stack connection.

7 **Consolidated Gas Co. of New York, N. Y., Brooklyn Gas Co.,** Coney Island, N. Y., **Brooklyn Union Gas Co.,** Brooklyn, N. Y., **Kings County Lighting Co.,** Brooklyn, N. Y., **New York & Richmond Gas Co.,** Stapleton, S. I., N. Y. The exhibit of the gas companies of the New York metropolitan district will feature heat and coal for industry; refrigerators, house-heating and water-heating equipment.

760 761 **Cork Foundation Co., New York,** Voss refrigerating equipment, Absorbo natural cork mat, isolating fans, motors, generators, and miscellaneous equipment.

261 262 **Cutler-Hammer Mfg. Co., Milwaukee, Wis.,** automatic starters, motor operated valve control, electrical heating units, motor control accessories.

699 **Davel, A. W., & Co., Inc., Brooklyn, N. Y.,** oil burners.

535 536 **De Bothezat Impeller Co., New York,** apparatus demonstrating the flow phenomena around fan blades, 48-in. pressure fan, 24-in. and 30-in. fans, bifurcator with 24-in. fan, unit heater, forced draft 8-in. fan, residential kitchen fan, and air filtering unit with 18-in. disc pressure fan.

10 **D'Este Co., Julian, Boston, Mass.,** steam pressure regulators, steam traps, damper regulators, Curtis type T return trap.

714 **Detroit Edison Co., Detroit, Mich.,** layout for piping for power and heating plants.

254 **Dixon Crucible Co., Joseph, Jersey City, N. J.,** pipe joint compound, flake graphite, graphite greases.

613 **Domestic Sales Co., Brooklyn, N. Y.,** exhibiting the International automatic coal burner.

217 218 **Domestic Stoker Co., New York,** H2R Electric Furnace-Man in operation under fire; type "M" Electric Furnace-Man, and type "K" or double burner pot Electric Furnace-Man.

235 236 **Dunham Co., C. A., Chicago, Ill.,** Dunham differential vacuum heating system operating units.

6 **Duriron Co., Dayton, Ohio,** acid-proof Duriron equipment, including exhaust fans, pumps, valves, pipe and fittings, and circulating steam jets.

81 82 **Ellison Draft Gauge Co., Chicago, Ill.,** various types of draft gauges, Pitot tubes and calorimeters.

635 636 **Erie Heating Systems, Inc., Erie, Pa.,** unit heaters.

409 **Farnsworth Co., Conshohocken, Pa.,** condensation drainage receiver type pump, high temperature boiler feeder, paper drying system, oil separator, steam separator, steam trap.

215 216 **Federal Gauge Co., Chicago, Ill.,** see Mercoid Corp.

8 **Fireking Stoker Co., Indianapolis, Ind.,** stoker in operation.

662 663 **Fitzgibbons Boiler Co., Inc., New York,** steel boilers.

52 **Frank Heater & Engineering Co., Inc., O. E., Buffalo, N. Y.,** oil cooler.

545 546 **Garlock Packing Co., Palmyra, N. Y.,** complete line of mechanical packings manufactured from asbestos, rubber, fibre and metal.

565 **General Insulating & Mfg. Co., Alexandria, Ind.,** high temperature Flexfelt, rock wool pipe covering, high-temperature insulating block, cements, brick, loose and granulated rock wool.

230 231 **General Stoker Corp., New York,** automatic underfeed coal burner.

47 58 **Gifford Heat Control Systems, Inc., New York.**

86 87 88 **Gillis & Geoghegan, Inc., & G & G Atlas Systems, Inc., New York,** ash removal equipment.

308 to 311 **Grinnell Co., Inc., Providence, R. I.,** fabricated piping, pipe bends, lap joints, pipe hangers, Thermoliers (3 sizes), Equiflo valve, Grinnell cast-iron fittings.

567 568 **Glore, Evins F., & Son, Long Island City, N. Y.**

60 **Hardinge Co., Inc., York, Pa.,** unit coal pulverizer, scene-in-action picture Hardinge method of air classification.

301 **Hartzell Propeller Co., Piqua, O.,** Charaway fans and blowers in operation.

17 **Heat Transfer Products, Inc., New York,** pictures of heat-exchange equipment.

658 659 **Heating and Piping Contractors National Association, New York,** and the local associations in New York City and Newark, N. J., material demonstrating the use of the Heating and Piping Contractors National Association Engineering Standards and explaining certified heating.

551 **Heating and Ventilating Magazine, The, New York,** sample copies of The Heating and Ventilating Magazine and Oil Heat, Home-study course, Iso-degree day chart, technical books of interest to members of the heating and ventilating industry, data sheets, charts, etc.

2e **Hill Co., E. Vernon, Chicago, Ill.,** Pitot tubes, draft gauges, dust counters, psychrometers, anemometers and thermometers.

437 438 **Hoffman Specialty Co., Inc., Waterbury, Conn.,** complete line of working and open samples of venting valves and "Controlled Heat" specialties. Continuously operating motion picture entitled the "Heat Thief" explaining operation of No. 2 Hoffman valves. Operating models of new Hoffman electric heater.

23 **Illinois Engineering Co., Chicago, Ill.,** glass model of steam trap in operation, Illinois zone heat control and line of heating specialties.

648 649 **Johnson Co., S. T., Oakland, Calif.,** oil burners.

541 542 **Johnson Service Co., Milwaukee, Wis.,** line of automatic temperature and humidity control apparatus, including air compressor outfit, thermostats, humidostats, metal diaphragm valves, dampers and pneumatic damper motors of various types; working model demonstrating the new Dual system of control.

229 230 **Keating Pipe Bending & Supply Co., E. F., New York,** Van Stone joints, pipe bends, welded headers, Van Stone joints on brass pipe, coils of various types in steel, iron, brass and copper.

281 **Kieley & Mueller Inc., New York,** pressure reducing valves, temperature regulators, steam traps and pump governors.

503 **King-Seeley Corp., Ann Arbor, Mich.,** complete line of hydrostatic gauges for the distant reading of tank levels.

555 **Korfund Co., Inc., New York, Troy** engine in operation on Korfund Vibro dampers. Displays of Korfund natural cork mats and Vibro dampers.

619 **LaMont Corp., New York,** steam generator, LaMontube water walls and screens, steam flow valves.

538 539 **Landis Machine Co., Waynesboro, Pa.,** 6-in. Landis pipe threading and cutting-off machine in operation, Land-Matic heads, Lanco Heads, Landex heads, Victor collapsible taps.

314 315 321 322 **Latham & Co., E. B., New York,** see American Blower Company.

20 **Leeds & Northrup Co., Philadelphia, Pa.,** L & N metered combustion control equipment, $CO_2$ recorders, indicators; resistance thermometer recorders of the automatic type; generator field temperature recorders; multiple point indicating and recording equipment including instruments and accessories.

558 559 **Lincoln Electric Co., Cleveland, O.,** welder, portable, latest style, with welding table for overhead welding; display board with castings and their equivalent steel shapes; motor running under water; complete set of welded samples; welding supplies, head shields, hand shields, electrode holders; electronic tornado automatic welding head.

334 335 **Linde Air Products Co., New York,** complete line of equipment and supplies for oxy-acetylene welding and cutting; special emphasis on developments and improvements in the procedure for welding pressure vessels.

476 **Liquidometer Corp., Long Island City, N. Y.,** distance reading liquid level tank gauges and direct reading tank gauges.

501 **Lloyd Engineering Co., Bellville, N. J.,** ventilators, unit heaters, exhaust systems.

295 **Marsh & Co., James P., Chicago, Ill.,** Hilo vacuum and vapor heating systems, radiator traps, radiator valves, boiler return traps, automatic air valves, air eliminating devices, Marsh Merkustat, electric control instruments, indicating and recording gauges, pressure gauges, vacuum gauges, working models of a scene of a Marsh Hilo vapor system with the various specialties and devices in actual operation, and a working model of the Marsh Merkustat water level control instrument.

221 222 **Mason Regulator Co., Boston, Mass.,** Mason bronze and iron body reducing valves, pump pressure regulators, hydraulic damper regulators, solenoid valves, liquid level controllers.

300 **McQuay Radiator Corp., Chicago, Ill.,** concealed radiators, visible cabinet type radiators, and unit heaters.

215 216 **Mercoid Corp., Chicago, Ill.,** Mercoid combination low-water cut-off and pressure control, controls for oil-burners, boilers, furnaces, etc., thermostats, pressure controls, immersion type controls, Risertherm, Visaflame, combination panel units, Pyratherm (various types) combination low water pressure controls, double adjustment controls, furnace controls.

342 **Midwest Air Filters, Inc., Bradford, Pa.,** vertical and horizontal self-cleaning air filters; sinuous filter medium, humidifier.

665 **Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.,** thermostatic controls, valves, etc.

219 220 **Modine Mfg. Co., Racine, Wis.,** unit heaters, cabinet heaters and concealed heaters.

449 **Multicell Radiator Corp., Buffalo, N. Y.,** copper unit heaters and condensers.

66 67 **Nash Engineering Co., South Norwalk, Conn.,** vacuum and condensation pumps, compressors.

509 **National Regulator Co., Chicago, Ill.,** thermostats, pneumatic valves, pneumatic damper motors, boiler regulators, hot-water regulators, furnace regulators, etc.

297 **Nugent & Co., Wm. W., Chicago, Ill.,** oil filtering system, oil filter, sight feed valves, oil pumps, telescopic oilers, compression union pipe fittings, multiple oilers.

551 **Oil Heat, New York,** sample copies of the magazine; "House Heating with Oil Fuel," by P. E. Fansler, data sheets, charts, etc.

490 **Peerless Machine Co., Racine, Wis.,** portable pipe-threading machinery.

500 **Peerless Electric Co., Warren, O.,** full line of fans; ventilators, grinders.

743 **Perkins & Son, Inc., B. F., Holyoke, Mass.,** mullen testers.

772 **Permutit Co., New York, Ranarex** instruments for recording $CO_2$ density.

529 **Pipe Hanger Equipment & Specialty Co., New York,** pipe hangers.

446 **Pipe Saver Corp. of America, Carthage, N. Y.,** a new device called Pipe-Saver.

283 284 **Powers Regulator Co., Chicago,** automatic temperature control equipment for rooms and industrial processes using steam for heating, etc., thermostatic water controllers, shower mixers, steam traps.

303 304 305 **Preferred Utilities Co., Inc., New York,** commercial type fuel oil burners, Ray full automatic fuel oil burners, model D automatic Hart fuel-oil burners, triple service boiler.

89 90 **Quigley Furnace Specialties Co., Inc., New York,** Hytempite, high temperature cement (displaying various practices).

749 750 **Rathgeb Grate Co., Inc., New York,** water heaters.

303 **Ray Mfg. Co., W. S., San Francisco, Calif.,** oil burners.

302 **Raymond Co., F. I., Chicago, Ill.,** high voltage, low voltage and gas actuated Duo-Stat.

34 **Reeves Pulley Co. of N. Y., Inc., New York,** automatic mechanical, automatic electrical, remote mechanical and remote electrical variable-speed transmissions; variable-speed power unit drives; completely inclosed variable speed transmissions; double-block center-pull V-belt; variable speed transmission.

620 621 **Reliance Electric & Engineering Co., Cleveland, O.,** fully-inclosed fan-cooled motor operating in a glass case.

556 **Ric-wiL Company, Cleveland, O.,** miniature district heating system showing factory buildings being supplied with steam through Ric-wiL conduit. An exhibit of Ric-wiL tile conduit on base brain, showing it in various stages of progress construction; shutters, joint compound, conduit fittings, and rollers, and filter cloth.

229 230 **Reading Iron Co., Reading, Pa.,** wrought-iron pipe showing its development from the initial process to the finished product.

639 640 **Rome Brass Radiator Corp., New York,** Robras 20-20 finned type radiators, Robras electric steam radiators, Robras DeLuxe electric steam radiators, Robras prime surface radiators, complete metal enclosures for Robras finned type radiators.

33 **Sarco Co., Inc., New York,** various types of steam traps for the industrial field, standard and special temperature regulators for hot-water service tanks, industrial processing, dry kilns, etc. A special feature will be the complete Sarco heating line, including inlet valves, thermostatic traps, blast traps, air eliminators, and other apparatus required for low-pressure vacuum and vapor heating systems.

76 **Schade Valve Mfg. Co., Philadelphia, Pa.,** steam, water, air and oil valve specialties.

567 568 **Shaw-Perkins Mfg. Co., Pittsburgh, Pa.,** air preheater for heating combustion air — industrial heating, drying, and other uses. High convection radiator for steam and water heating, cooling, drying and industrial applications.

516 517 **Spencer Turbine Co., Hartford, Conn.,** turbo compressor for supplying air at moderate pressures and vacuum for oil and gas burning industrial furnaces, foundry cupolas, agitation of liquids, etc.

611 **Sprucolite Corp., Bloomfield, N. J.,** standard motor pulleys, split line shaft pulleys, machine pulleys, friction filters, gears, "V" grooved pulleys and running display of sixteen pulleys on one belt, also "V" pulley drive.

717 to 719 **State of New York Department of Labor, Bureau of Industrial Hygiene, New York,** Models in operation of exhaust systems, wax models showing industrial diseases contracted in industry.

419 420 **Staynew Filter Corp., Rochester, N. Y.,** air filters of different types and sizes.

557 **Stockham Pipe & Fittings Co., Birmingham, Ala.,** cast-steel flanged and screwed fittings, malleable fittings for oil lines, cast iron flanged and screwed fittings.

78 79 **Sturtevant Co., B. F., Boston, Mass.,** multistage centrifugal compressors and stationary and heavy-duty portable vacuum cleaners.

75 **Swartwout Co., Cleveland, O.,** ventilators, steam, oil and air separators, exhaust heads, high and low-pressure traps, boiler return traps, lifting traps, regulators and reducing valves.

477 **Sweet & Doyle Foundry & Machine Co., Troy, N. Y.,** application of gas conversion system to a Richardson & Boynton house-heating steam boiler.

749 **Taco Heaters, Inc., New York,** indirect water heaters.

59 **Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.,** Tag automatic recorder-controller, industrial thermometers, recording thermometers and recording pressure gauges, barometers, absolute pressure gages, and U-gages; Tag Mono Automatic CO and $CO_2$ indicator-recorder; testing instruments for conducting A.S.T.M. tests on lubricants and fuel oils; etched stem thermometers, hydrometers, hygrometers, etc.

507 **Taylor Instrument Companies, Rochester, N. Y.,** indicating and recording thermometers, industrial thermometers, recording pressure gauges, mercurial and aneroid barometers, mercury column vacuum gauges, indicating and recording pyrometers.

203 **Thermal Units Co., Chicago, Ill.,**
204 models of Thermal Units, one heating and one cooling the air.

679 **Thermo Service, Inc., New York,** boilers, Triple-Service heating boiler.

634 **Toledo Pipe Threading Machine Co., Toledo, O.,** pipe machine, power drives, pipe tools for cutting and threading.

289 **Torchweld Equipment Co., Chicago, Ill.,** Torchweld non-flash gas welding and cutting equipment, brazing and soldering equipment, welding accessories and supplies.

252 **Trane Co., LaCrosse, Wis.,** bellows
253 packless valves, bellows radiator traps, high pressure and thermostatic traps, vents, and strainers; new model condensation pump representing a complete line of centrifugal pumps; unit heaters; heat cabinets and concealed heaters; under-window type concealed unit.

267 **Trerice Co., H. O., Detroit, Mich.,** steam traps.

14a **Universal Humidifier Corp., Newark, N. J.,** humidifying apparatus.

515 **Van Dorn Electric Tool Co., Cleveland, O.,** electric drills, grinders, wrenches, screw drivers, and other portable production tools.

223 **Vinco Co., Inc., New York,** glass
224 boiler demonstration on priming and foaming boilers, their causes, behavior and methods of cure.

225 **Warren Webster & Co., Camden,**
226 **N. J.,** Webster systems of steam heating and Webster system equipment.

39 **Watts Regulator Co., Lawrence, Mass.,** valves and regulators.

562 **Webster Tallmadge & Co., Inc., New York,** electric heat controls and heating apparatus.

631 **Williams Tool Co., Erie, Pa.,** pipe threading machinery.

28 **Wright-Austin Co., Detroit, Mich.,** steam and oil separators, exhaust heads, steam traps, air traps, alarm water column and water column trimmings, Airxpel, bucket steam trap, and Kleervu gauge glass protector.

256 **"X" Laboratories, New York, "X"** boiler liquid used to repair leaks in steam and water boilers of both high and low pressure.

# New Apparatus and Appliances

## Lewis Air Conditioner

A unit air conditioner for domestic purposes has been announced by the Lewis Corp., Minneapolis, Minn. Heated air is driven by a fan against a countercurrent of water trickling down corrugated plates. There are 11½ sq. ft. of water surface exposed and it is possible to evaporate over a gallon an hour. Dust particles are retained by the water and carried to the drain pipes. The circulation of the air amounts to 150 cu. ft. per min. and the use of the fan prevents stratification of heated air at the ceiling and cold air on the floor. The housing, plates and water pipe are made of heavy-gauge copper and brass to prevent corrosion. The top of the cabinet is heat insulated so that it can be used for vases and other ornaments. This conditioner also can be supplied in a concealed type.

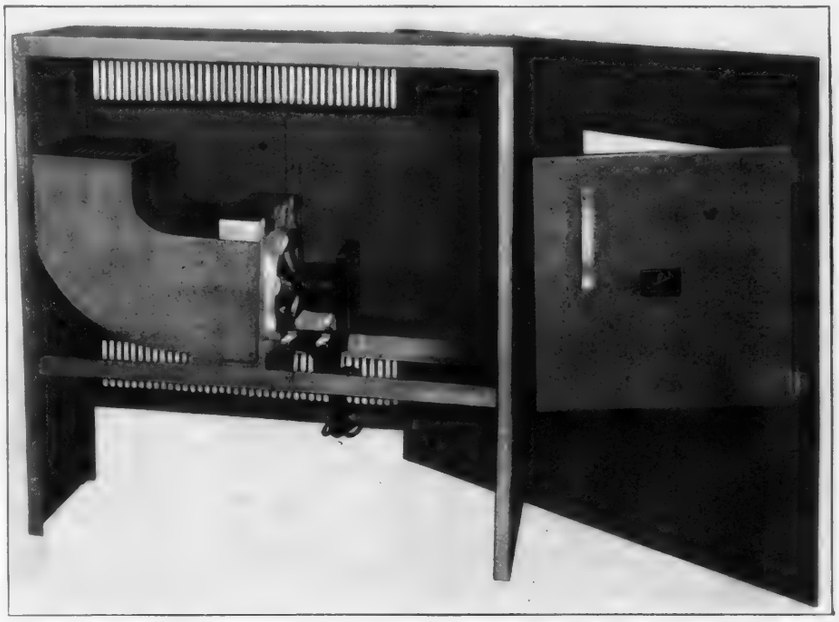
The heater is constructed of copper tubes held in place by horizontal copper fins and the top and bottom headers are of a special cast-bronze alloy. The capacity of the cabinet is 55 sq. ft. of equivalent cast-iron radiation. These units are equipped with a special condenser-type low-speed 110 volt single-phase A. C. motor. An aluminum disc type fan is used.

Thermostat control is furnished, and a humidity control keeps the air at the proper degree of humidity. A mechanically operated valve is used to control the water flow to the humidifier plates. The cabinets are finished in Duco and are available in six colors. Where other finishes are desired, a priming coat only is applied at the factory.

## Smolensky Seatless Flanged Valve

A seatless flanged valve to be used as a blow-off valve, globe or gate valve, steam, oil or water lines, has been announced by the Smolensky Valve Co., Inc., Cleveland, O. This valve is shear type in operation and automatically removes from the disc any sand or shale that might deposit there. It consists of a valve body with a double, straight-way passage, stationary-disc face, movable-geared valve-disc, three-toothed valve stem, bonnet, handle, wedge ring and assembly ring with coil springs provided for the purpose of grinding the valve automatically and assuring tight closing. When the valve is open the movable disc face covers the equally shaped stationary disc face in the valve body and there is no seat.

This valve should be installed with the assembly end to the pressure. This assures tight closing of the valve as the pressure holds the movable disc tight to the face of stationary disc in the valve body. It is made in solid bronze in sizes from 1 in. to 12 in. and does not require packing.



**Lewis Air Conditioner Is Combination Radiator and Humidifier**

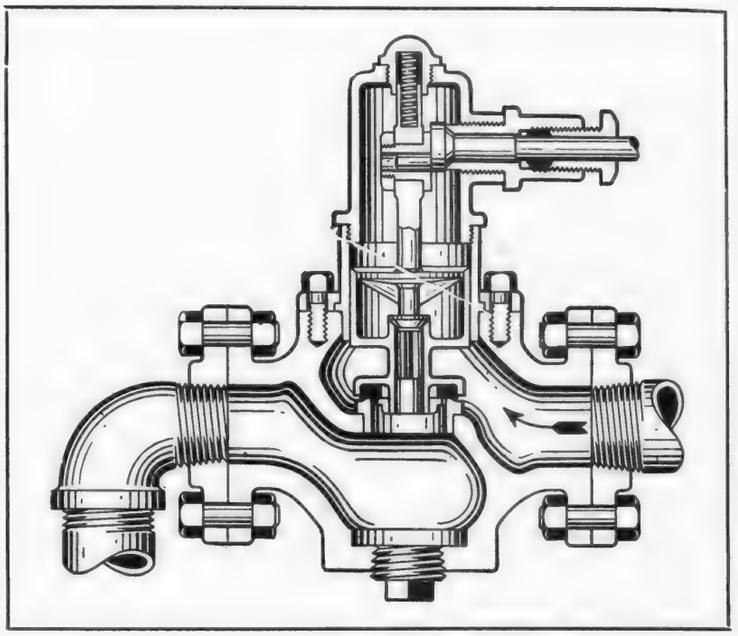
## Piston-Type Pressure Regulators

The American Automatic Valve Corp., Chicago, have placed on the market the American automatic piston-type pressure regulator. This regulator is so designed and constructed that all parts can be removed with the aid of an ordinary wrench without taking the regulator out of the pipe line. A feature of this device is the removable port sleeves which take the place of the ordinary seat bushing. The entire inner valve and piston are in one piece so that chattering is eliminated.

The controlling mechanism is attached to the body by means of a swivel ring. The lever mechanism can be swung into any desired position in relation to the pipe line. There are no wings attached to the inner valves.

The initial pressure enters the regulator from the inlet side and, due to the balanced inner valve, the pressure is distributed, permitting the outlet pressure to build up to the desired amount. The outlet pressure acting upon the lower surface of the piston is responsible for the regulation from there on. As the outlet pressure builds up, the regulator automatically will tend to close, and when the outlet pressure tends to fall below requirements, the regulator automatically opens.

Any desired outlet pressure is obtained by adding or taking off the weights. These valves operate at all pressures from 2 lbs. up and can be supplied in diameters ranging from ½ in. to 16 in.



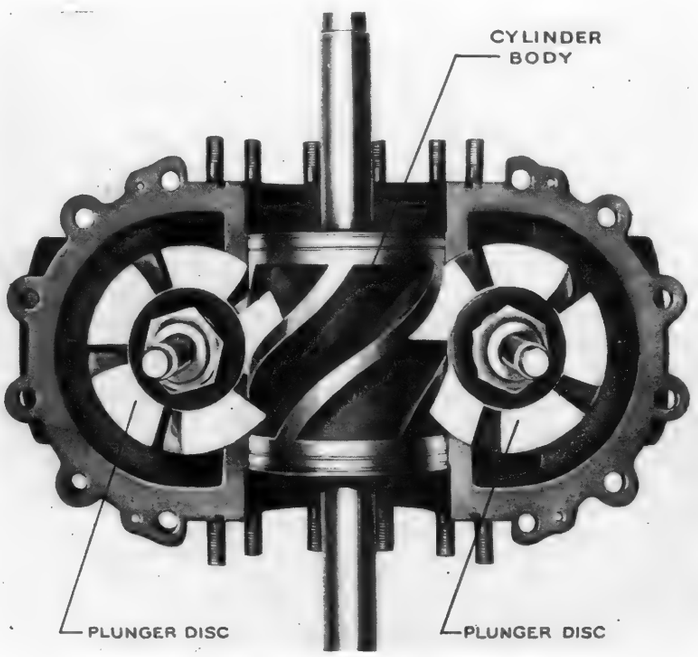
American Automatic Piston-Type Pressure Regulator

## DuBus Pump for Viscous Liquids

Based on a new principle, the application of which the manufacturers claim will greatly simplify the problem of handling fuel oils, tarry products and other viscous and heavy liquids, the W. B. Connor Co., Inc., Lincoln Park, N. J., has recently announced the DuBus pump. In this pump there are only three moving parts, the cylinder body and two plunger discs. The only other parts are necessary bearings and the pump casing which is divided horizontally into two sections. There are no valves, springs or small parts. The cylinder body is provided with five grooves. These grooves constitute the cylinder of the pump, and each groove is cut in an accurately computed spiral, machined to the closest tolerances. The cylinder body is mounted on ball bearings and rotates in a close-fitting housing, formed by the upper and lower sections of the pump casing, in which are the intake and discharge ports. Two plunger discs, suspended from ball thrust bearings, are located one on each side of the cylinder body. Each plunger disc has five specially formed blades which accurately fit into the grooves of the cylinder body, thus providing the plunger action.

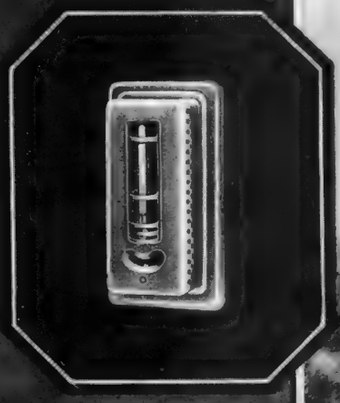
The cylinder body is driven, and in turning it causes the two plunger discs to rotate, much the same as a worm drives its gear; this results in a smooth, sliding contact which transmits the motion with a slight expenditure of power and a high efficiency. Easy turning of the plunger discs is further facilitated by ball bearings in which the disc shafts are mounted. The cylinder grooves are filled and emptied twice in one revolution, and the action is positive and continuous.

These pumps are available in fourteen sizes, seven of which are for working pressures up to 125 lbs. per sq. in. and the other seven up to 250 lbs. per sq. in. They also can be furnished for almost any required capacity and for pressures anywhere from 1 lb. to 1000 lbs. per sq. in. under special specifications.




DuBus Pump for Viscous Liquids

NEW YORK LIFE INSURANCE COMPANY BUILDING



*Architect* ▸ CASS GILBERT ▸ ▸ *Engineer* ▸ SAMUEL A. McGUIRE
*Consulting Engineers* ▸ MEYER, STRONG & JONES

## 1,000,000 *Cubic Feet of Air Per Minute* at the Right Temperature

**The temperature of the big volume of air distributed by 56 Sturtevant fans in the imposing building shown above, is controlled by Powers Thermostats.**

**Simplicity of construction, durability and long service without repairs are some of the features which caused the selection of Powers Control in preference to others for this purpose. Powers *graduated* control can be depended on to give many years of reliable service without expert attention and the user is insured the maximum return on the investment in heat control.**

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*35 Years of Specialization in Temperature Control*
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*Offices in 35 Other Cities*
The Canadian Powers Regulator Company, Toronto, Ontario

POWERS

## Condensation-Return Pump and Receiver

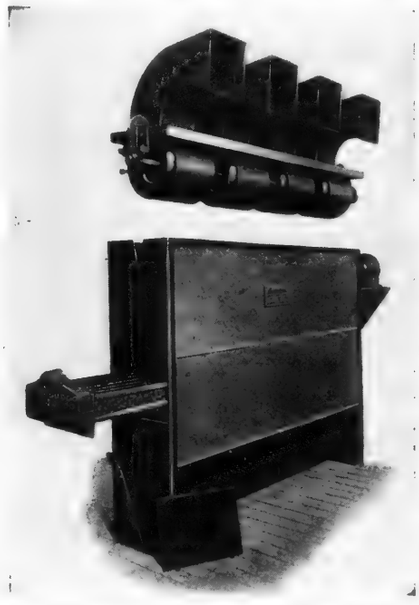
A centrifugal condensation-return pump and receiver has been announced by Goulds Pumps, Inc., Seneca Falls, N. Y. This unit consists of a vertical galvanized tank, 24 in. in diameter and 40 in. long, with a two-stage pump suspended from the top. The pump shaft and float rod operate through stuffing boxes so that the set can be used under pressure. The tank has two inlets, both tapped for 3 in. pipe The discharge from the pump to the boiler is 1 in., and the tank has a tapping for vent connections.

The unit will handle condensation from 10,000 sq. ft. of direct radiation based on ½ lb. of condensation per sq. ft. per hr., or 15,000 sq. ft. based on 1/3 lb. of condensation per sq. ft. per hr. The discharge is approximately 40 gals. of hot water per minute against 17 lbs. pressure. A ½ H.P., 1730 R.P.M. repulsion-induction type motor is supplied for use with either 110 or 120 volt, 60-cycle current.

Goulds Return Pump and Receiver

## Vinco Laboratory Service

The laboratories of the Vinco Co., 75 Vesey St., New York, are offering a service for those who are having trouble with problems involving priming, foaming and slow steaming boilers. All manufacturers whose products and whose service costs are affected by priming boilers and who are accredited users of Vinco are eligible to receive this free "certified chemically correct" laboratory service. When mechanical trouble is suspected, a water sample can be sent before using Vinco; or, if after Vinco has been used and directions followed and the priming, foaming and slow steaming have not been cured, a sample of the water should be sent to the laboratory where it will be analyzed and the findings and suggested improvements will be reported. Complete information concerning this service can be obtained from the Vinco Company.



Sirocco Unit Heater with Parts Removed to Show Construction

## Sirocco Unit Heater

American Blower Corp., Detroit, Mich., has announced the Sirocco unit heater, one of which will deliver as high as 12,000 cu. ft. of air per min. A copper heating element is used in the standard design of this heater which can be used either as a floor stand or ceiling type unit. It is claimed that this heater operates at a lower tip speed than any other unit system fan being used as an air propelling medium. The fan wheel consists of a multiple number of curved blades designed to deliver a maximum volume of air with a smooth uniform action over the entire width. The discharge cowls are air nozzles of the Evase type that direct the air flow from the heater with a high discharge velocity and low resistance.

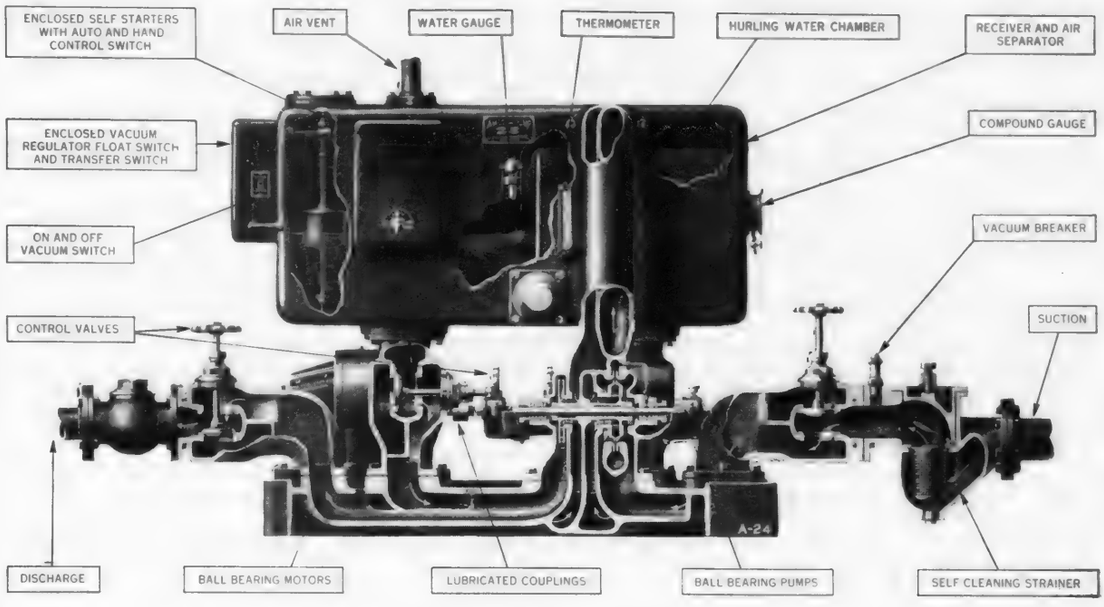
The heating element consists of staggered rows of copper-fin tubes expanded into one-piece cast-iron headers. The tubes are ¾ in. outside diameter, with a flat copper continuous fin, ⅜ in. deep, metallically attached to each tube. This element is tested at 1000 lbs. hydraulic pressure. For low and medium steam pressure operation, a heating element having four rows of tubes in depth is supplied, while for high-pressure installations, three rows of tubes are used. If desired the heater can be furnished with a pipe coil heating element. Available in seven sizes, these heaters can be supplied in either floor stand or expanded ceiling type models. Capacities range from 1256 C.F.M. to 8030 C.F.M.

## Payne Gas Furnaces

A line of gas furnaces developed on the west coast is being marketed by the Payne Furnace & Supply Co., Inc., Beverly Hills, Cal. Each burner is equipped with a pilot which lights the burner when the gas supply is turned on. The supply is controlled either by an electro-magnetic valve with push buttons, or by a magnetic gas valve for use with a thermostat, or by a manually controlled valve operated by a chain and dial. These furnaces are made in units, the desired capacity being obtained by grouping of different sized units. The heating element or radiator is made of rust-resisting material, electrically welded along the seams and joints. Hot gases, the products of combustion, are carried through the heating element and out through the vent. The casings are of galvanized iron, insulated against radiation losses. For mild climates, these furnaces are supplied without a cold air return, but for more severe climates they are equipped with cold air boots. Bonnets are supplied with detachable top casing collar bonnets, which are used in most installations. Unit furnaces are available in six sizes with heat pipe capacities ranging from 90 sq. in. to 540 sq. in. Gas consumption ranges from 37.5 to 225 cu. ft. per hr. of 600 B.T.U. gas, or 20.4 to 122.7 cu. ft. per hr. of 1100 B.T.U. gas.

Payne Gas-Fired Warm-Air Furnace

# AMES Duplex Vacuum Heating Pump

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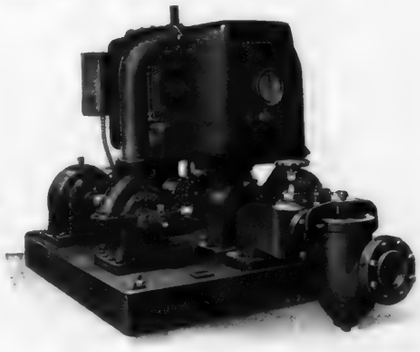
On Your Next Job Specify
EQUIPMENT

*Backed by a THREE YEAR guarantee against wear*



*Write for Bulletin 52-C12*

**AMES PUMP COMPANY, Inc.**

90 West Street New York, N. Y.

*Representatives in Principal Cities*

DISTINCTIVELY DIFFERENT

# New Trade Publications

**Tabasco Hot Stuff Water Heaters** are described in a folder received from the Kewanee Boiler Corp., Kewanee, Ill. These heaters are designed for water heating in average size and large buildings. They are simply constructed and built of steel for city-water pressures. Furnished in seventeen sizes to heat from 130 to 700 gal. of water per hour, they can be supplied in either the surface-burning or magazine types. All models contain brass cleanout plugs and improved rocking grate. Tables of capacities and dimensions are given in the circular together with photographs of the two types of heater and photographs of typical installations.

**Sales Service Bulletins** recently issued by the Bryant Heater & Mfg. Co., Cleveland, O., treat of organizations for selling house heating equipment and how to find prospects. One, printed in red and black, covers the compensation of salesmen, equipment, advertising, installation and service, time payment plans, and estimates. Selection of salesmen receives considerable attention. A second bulletin, printed in green and black, gives suggestions on the methods of locating prospects for Bryant gas heaters. Among the channels to watch are suggested the users of automatic gas-heating equipment, new construction (building reports, architects and builders), executive lists, showroom visitors, the heating trade, prospects suggested by other prospects, builders' shows, model homes, gas company employees, other salesmen in kindred lines, direct-mail advertising and newspaper advertising. It urges the dealer to keep a large supply of good prospects always on hand.

**Automatic Controls for Time, Safety, Pressure, Humidity and Temperature,** appears on the cover of a booklet by the Time-O-Stat Corp., Milwaukee, Wis. This is a loose-leaf catalog showing the various contro's now manufactured. Clock thermostats are equipped with Seth Thomas clocks and Tycos thermometers. Control motors are manufactured by the General Electric Company and controls are by snap-action blades. Diagrams show the manner in which these controls are installed. The Temp-O-Stat, also shown in this booklet, is a limit control that is installed on warm-air pipes.

**Rex Gas Furnaces and Heaters** are described and illustrated in a new folder issued by the manufacturers, Calkins & Pearce, 751 East Long St., Columbus, O. These are heaters for warm-air installations, ranging in size from small garage units to heaters handling 1200 sq. in. of pipe area. The company also makes auxiliary gas furnaces to be attached to a furnace using solid or liquid fuel. All construction is of sheet metal.

**Economical Gas Heating** is a brochure recently published by James B. Clow & Sons, P. O. Box N N, Chicago, manufacturers of Clow Gasteam radiators "for the smallest room or the largest building." Vented and unvented radiators made by the company are heated by steam generated in the unit by a gas flame. Pressure is held constant by a regulating valve. The booklet contains pictures of buildings over the country that are heated by these radiators.

**A Cloud of Steam Is Golden Fleece,** announces the Foxboro Co., Foxboro, Mass., on the outside of a direct-mail piece recently distributed to manufacturers. Temperature recorders and controllers are pictured in this folder and their use is urged to prevent waste.

**Massachusetts Modified Unit Heaters** are described in a new folder by the Bishop & Babcock Sales Co., 4901-4915 Hamilton Ave., Cleveland, O. Complete specifications are given for every detail of the heaters from the casings to the heating units, and photographs and drawings illustrate the appearance and construction of the integral parts as well as the whole unit. Installations of these heaters are shown in offices, factories, and warehouses. Besides unit heaters, the company manufactures a full line of fans and blowers, compressors, controls, valves and traps, which are mentioned in this booklet. Size 8½ in. x 11 in. Pp. 24.

**Cardinal Points in the Selection of Your Oil Burner** are suggested in an orange-covered booklet recently distributed by the Gulf Oil Burner Co., 1627 Chestnut St., Philadelphia. It stresses the automatic features and the conveniences claimed for oil heat. The cardinal points to be kept in mind in the selection of oil-heating equipment, according to this booklet, are the responsibility of the manufacturing company and the dealer who sells an oil burner; the ability of the burner to keep the house at the temperature desired at the lowest possible cost; the dependability of the burner to insure constant operation; and the simplicity with which the burner is constructed, in order that the life of the machine may be as long as possible. Size 7¼ in. x 10½ in. Pp. 26.

**Wagner Single Phase Motors** are described in Bulletin 157 issued by the Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo. The type RA starting induction running brush lifting motors, which are described in this bulletin, can be used in applications wherein it is required that the motor will deliver an extra heavy torque in starting, or so that it will exert an extra heavy torque when the machine is running at normal speed, as is required in such applications as centrifugal pumps, blowers, etc. This line includes ratings of ⅛ to 20 H.P. wound for 110/220 or 220/440 volts.

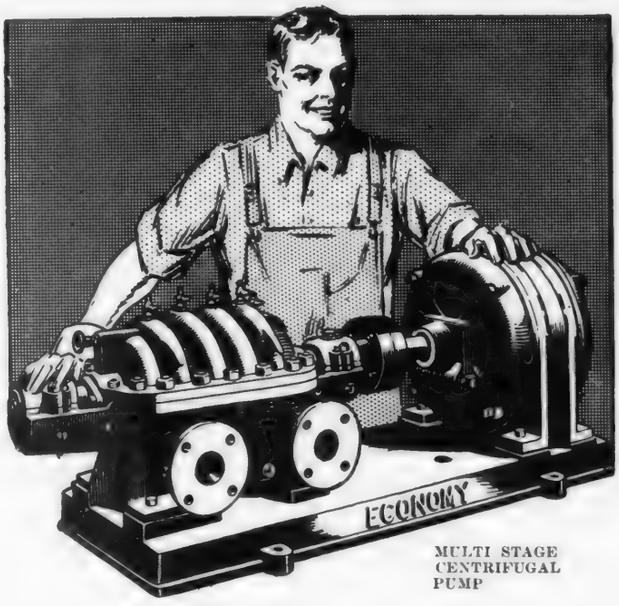
**Everdur Fittings, Valves and Jets** made from a manganese-silicon bronze, highly resistant to corrosive action, are featured in a circular, published by Schutte & Koerting Co., Philadelphia, Pa. These fittings, which are designed for use in chemical lines, are built for ordinary working pressures and are made in sizes from ⅛ in. to 4 in., inclusive, with screwed ends.

**They Don't Judge a House by the Exterior!** is the statement appearing on the cover of a newly issued circular of the Federal Merchandise Co., 140 South Dearborn St., Chicago, Ill. The necessity for good ventilation, especially in the kitchen, is outlined and the importance of keeping air conditions healthful in the interior of the home is stressed. A description of the Airmaster ventilating unit is given. This ventilator is equipped with a 10-in. propellor fan with a capacity of 800 cu. ft. of air per minute. The unit comes complete for installation.

**Herman Nelson hiJet Heater,** suspended type, is the subject of an unusually attractive and effectively presented catalog issued by The Herman Nelson Corp., Moline, Ill. Colored illustrations showing the air distribution with these unit heaters are used to show the advantages arising from their use. Cutaway views are used to show the construction details of the heater. Complete capacity tables giving the various entering air temperatures and steam pressures also are presented. Wiring instructions and dimension tables are shown. Size 8½ in. x 11 in., pp. 32.

**The Bayley Turbo-Atomizer** and the **Bayley Turbo-Air Washer and Air Conditioner** are described in illustrated bulletin No. 25 of the Bayley Blower Co., 732 Greenbush St., Milwaukee, Wis. Air-washing problems and their solutions are described in detail, complete descriptions of the mechanical features of the Turbo air washers being given with photographs of the parts. A large amount of engineering data and photographs of typical installations of this washer also are shown. Size 8½-in. x 11 in. Pp. 32.

# Seeing Your Job Through to Completion




MULTI STAGE CENTRIFUGAL PUMP

Do you want to turn over your entire pump installation to a single manufacturer? Or do you merely want to confer with specialists on an unusual pumping problem?

This concern is equipped to do anything in this line you may ask. Economy Pumps hold high records for efficiency, and their makers would be pleased to confer with your engineer at any time. Their recommendations, or whatever useful data is in their files, are at his disposal. We can, if called upon, supply all pumping equipment for an entire building. Our interest in your job continues even after water is running.

21 years experience in this field assures you of energetic and intelligent cooperation. Let us sit in with you when you figure, and if possible make suggestions.

***Write for Bulletin on type that interests you:***

- **405** Pumps and Receivers
- **406** Horizontal Split Case Multi-Stage Centrifugal Pumps
- **407** Centrifugal Sump Pumps
- **408** Single-Stage Double Suction
- **409** Non-Clogging Sewage Pumps
- **410** Air Line Vacuum Pumps
- **401** Electric Caisson and Mine Sinking Pumps

## ECONOMY PUMPING MACHINERY CO.

**3431 West 48th Place, Chicago**

*Representatives in principal cities—telephone and address under Economy Pumping Machinery Company*

# Economy Pumps

**Bayley Chinook Heaters** are featured in an elaborate catalog issued by the Bayley Blower Co., 732 Greenbush St., Milwaukee, Wis. Numerous photographs and drawings are shown explaining the design of the Chinook heater. Capacity tables at various steam pressures and entering air temperatures are presented, followed by engineering data and detailed drawings of typical installations showing piping connections. The information is well written and clearly presented, and will be of value to the layout man and contractor. Size 8½ in. x 11 in. Pp. 88.

**Cleaning the Air With the Ace Hand Cleaned Air Filter** is the title of an attractive bulletin published by the General Air Filters Corp., Division of the W. B. Connor Co., Inc., Lincoln Park, N. J. The necessity for clean air is described in the first chapter, followed by detailed information about the Ace hand cleaned air filter.

**Leader Steel Boilers for Oil Burning,** Bulletin 564N, is the subject of a circular received from the Leader Iron Works, Decatur, Ill. The manufacturers claim that real economy in oil burning can be accomplished only by using a boiler designed for burning oil, and that a boiler designed to burn soft coal cannot burn oil economically as it does not have enough heating surface. Stack temperatures of Koolstack boilers, it is claimed, run less than 300° F., and the boilers are ideally adapted to intermittent firing. Specifications of Koolstack boilers, dimensions and photographs of typical installations are shown with illustrations. The stack temperature control made by this company also is described. A photograph of the testing laboratory at the Leader plant is shown on the back page.

**Erie City Economic Boiler** is the title of a well illustrated booklet published by the Erie Iron Works, Erie, Pa. This boiler is a self-contained, semi-portable return-tubular steel boiler in which either hard or soft coal can be used. The furnace, brick work and boiler are shipped as a unit ready to set over the ash-pit. Views of this boiler when partially erected, and also after being installed, are shown in numerous illustrations. A special portion of the book is devoted to the use of an "Economic" for oil burning.

**The Water Goes Back to the Boiler or Your Money Goes Back To You** is the statement made by the Julian D'Este Co., Cambridge & Spice Sts., Boston, Mass. The Curtis type-T return trap is described and illustrated in detail in this circular. This trap is available in six sizes with capacities ranging from 1080 to 16,800 lbs. of water per hr.

**A Big Profit For You** is the message contained in a folder published by the Draft-A-Justor Corp., 513 West Jackson Blvd., Chicago, Ill. The Draft-A-Justor is a device which provides constant draft regardless of fuel used, and by furnishing a control of draft, enables the home-owner to cut down the amount of excess air and consequently save on his fuel bills. This circular is an appeal to heating contractors to increase their profits by selling the Draft-A-Justor.

**How to Begin the Application of Arc Welding** is the title of a booklet issued by the Lincoln Electric Co., Cleveland, O., which contains instructions for designers and production managers of companies using arc welding in the manufacture of their product. Most of the text is devoted to the redesign of machinery so that welding can be used, and the principles involved are set forth in such a manner that no designer can fail to find the text helpful. Many line drawings have been used to show how standard steel shapes are utilized to build up structural shapes which formerly were cast. Size 6 in. x 9 in. Pp. 32.

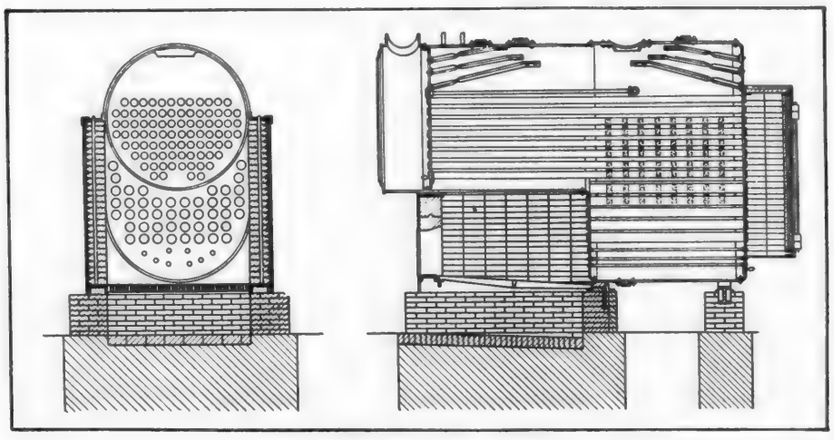
**Alcumite Structural Applications** is the title of a folder issued by the Duriron Co., Dayton, O. Among the advantages of Alcumite are acid resistance, fatigue resistance, retention of strength at elevated temperatures and resistance to wear. This material can be used for ducts carrying corrosive fumes, such as those from a chemistry laboratory or battery room. A photograph of an American "Sirocco" blower made entirely of Alcumite is shown as an example of the application of this material. Alcumite was developed gradually from the ordinary aluminum bronze (90% copper and 10% aluminum). Its average analysis is 87.5% copper, 7.7% aluminum and 3.5% iron; the balance being nickel when the alloy is furnished in rolled form.

A photograph is shown of a battery of Alcumite ventilators carrying off the sulphuric fumes from the rim pickling department of the Detroit plant of the Kelsey-Hayes Wheel Corporation.

**Circulair Heat, A New Method of Heating,** appears on the cover of a catalog by Circulair Heat, Inc., 215 Central Ave., Louisville, Ky. This book explains the difference between heat by radiation, convection and conduction and explains how a room is heated. The principles underlying the design of Circulair heaters and heat cabinets and the mechanical details of these heaters are described in some detail. Methods of heat control, economy of operation and economy of floor space are discussed in the text, leading up to a description of the appearance of this type of heating. Information on how to install these heaters, and engineering data as to heat emission also are presented. Size 8½ in. x 11 in. Pp. 44.

**Reference Data on Expansion in Pipe Lines** appears on the cover of a handbook issued by the American District Steam Co., North Tonawanda, N. Y. On the first page instructions and tables are presented which will enable the user to calculate the amount of expansion in pipe lines. Descriptions of construction, design and installation of externally-guided and internally-guided expansion joints are given, followed by dimensions and photographs of all types of expansion joints made by this company. These include all-brass riser expansion joints, standard single expansion joints, single and double slip semi-guided expansion joints, single and double slip internally-guided expansion joints, single and double externally-guided expansion joints, and duplex sleeve-guided expansion joints. Contractors and engineers will find this handbook useful as an aid in the selection of expansion joints for various purposes.

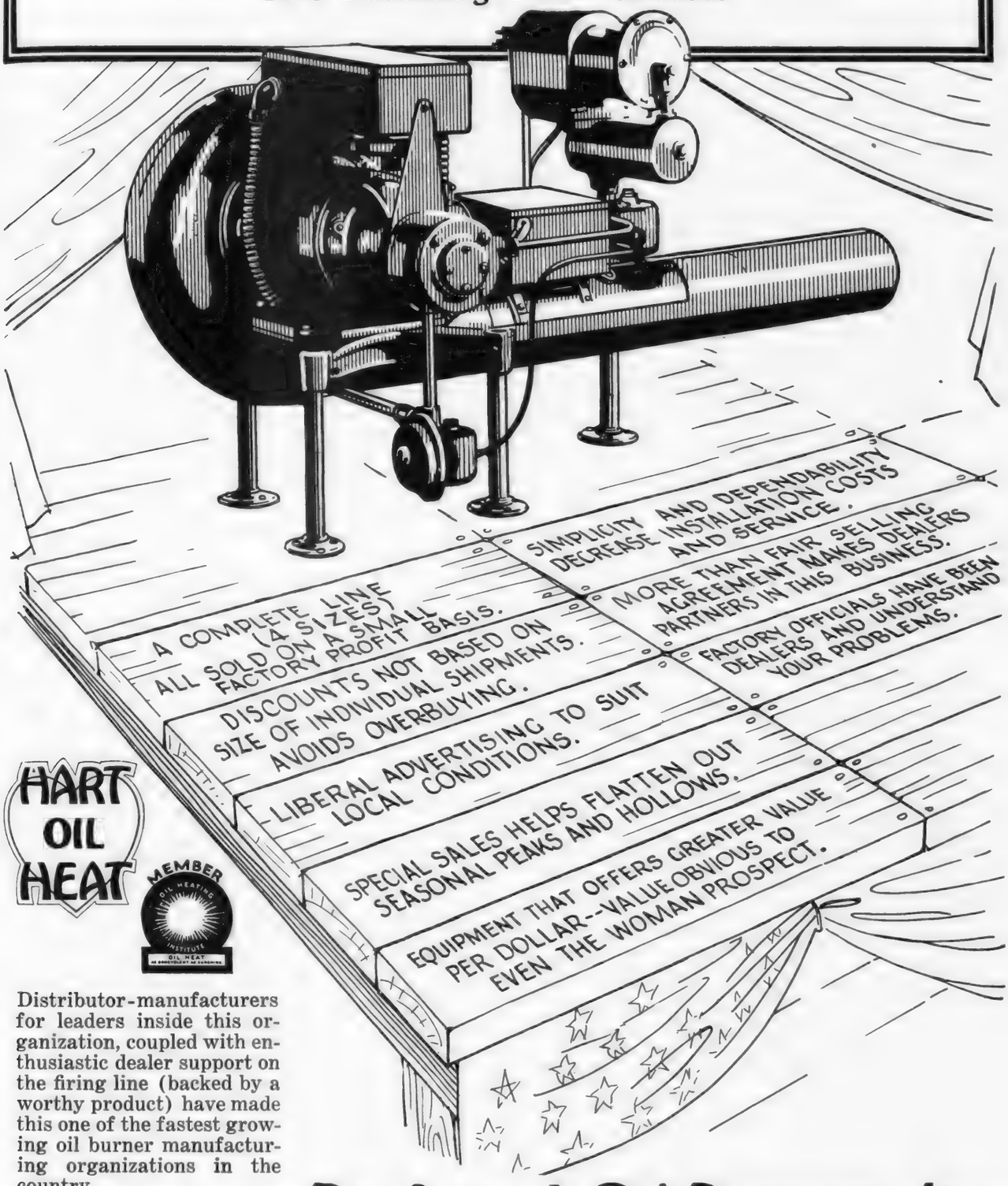
**Have Sheer Comfort and Cut Your Coal Bills** is the advice contained in a circular published by the H. M. Sheer Co., Quincy, Ill. The Sheer automatic temperature control for coal-burning furnaces is described and illustrated. This equipment is sold for $38 installed, and is guaranteed for one year.



Erie City Economic Boiler

# The Preferred Platform

## *On Which Hundreds of Oil Burner Dealers Are Founding Their Success*


A COMPLETE LINE (4 SIZES) ALL SOLD ON A SMALL FACTORY PROFIT BASIS.
DISCOUNTS NOT BASED ON SIZE OF INDIVIDUAL SHIPMENTS. AVOIDS OVERBUYING.
LIBERAL ADVERTISING TO SUIT LOCAL CONDITIONS.
SPECIAL SALES HELPS FLATTEN OUT SEASONAL PEAKS AND HOLLOWS.
EQUIPMENT THAT OFFERS GREATER VALUE PER DOLLAR--VALUE OBVIOUS TO EVEN THE WOMAN PROSPECT.
SIMPLICITY AND DEPENDABILITY DECREASE INSTALLATION COSTS AND SERVICE.
MORE THAN FAIR SELLING AGREEMENT MAKES DEALERS PARTNERS IN THIS BUSINESS.
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HART OIL HEAT

MEMBER OIL HEATING INSTITUTE OIL HEAT

Distributor-manufacturers for leaders inside this organization, coupled with enthusiastic dealer support on the firing line (backed by a worthy product) have made this one of the fastest growing oil burner manufacturing organizations in the country.

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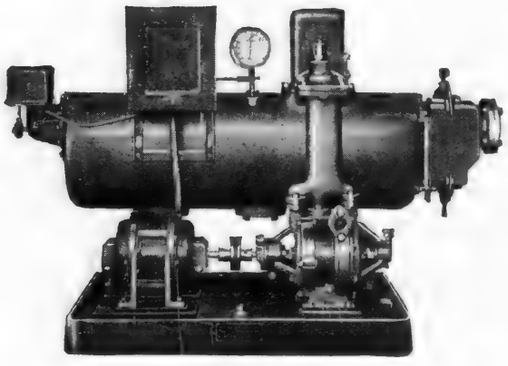
## Preferred Oil Burners, Inc.

**PEORIA, ILLINOIS**

# Guaranteed Capacities

## for both air and water



PUBLISHED air and water capacities of Jennings Vacuum Heating Pumps are the actual capacities that the pumps can be counted on to handle under working conditions.

The amount of water being removed by a Jennings Heating Pump at a given time has no effect upon the volume of air the pump will eject. Conversely, the maximum g. p. m. of water may be expected even though, at the same time, the full rated volume of air is being delivered.

Independent air and water units, combined in a compact assembly—each with a known capacity—predetermine the exact service that can be expected from a Jennings Vacuum Heating Pump. Install a Jennings and you can be sure that it will readily handle—at all times—the job to which it is assigned.

*For more complete information write for Bulletin 71*

TABLE OF CAPACITIES OF STANDARD JENNINGS HEATING PUMPS

| Size | Equivalent Direct Radiation sq. ft. | Diameter Standard Orifice Used for 10 inch Vacuum inches | Air Capacity cu. ft. per min. | Water Capacity At 180° F. Against 10 lbs. Pressure gal. per min. | Actual Motor H.P. for Delivering Water Against 10 lbs. Pressure | R.P.M. and Motor H.P. 10 lbs. | | R.P.M. and Motor H.P. 20 lbs. | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | R.P.M. | H.P. | R.P.M. | H.P. |
| T | 2,500 | 3-32 | 3 | 4 | .33 | 3600 | 1/3 | 3600 | ½ |
| U | 5,000 | 7-64 | 3 | 9 | .33 | 3600 | 1/3 | 3600 | ½ |
| V | 10,000 | 5-32 | 6 | 14 | * | * | * | 3600 | 1 |
| B | 16,000 | 3-16 | 9 | 22 | 1.4 | 1800 | 1½ | 1800 | 2 |
| C | 26,000 | 1-4 | 15 | 35 | 2.0 | 1800 | 2 | 1800 | 3 |
| D | 40,000 | 9-32 | 19 | 60 | 2.8 | 1800 | 3 | 1800 | 5 |
| E | 65,000 | 3-8 | 34 | 90 | 3.9 | 1800 | 5 | 1800 | 5 |
| F | 100,000 | 7-16 | 50 | 140 | 7.0 | 1800 | 7½ | 1800 | 10 |
| G | 150,000 | 9/16 & 5/16 | 102 | 200 | 9.8 | 1200 | 10 | 1200 | 15 |

*Size V not offered for 10 lbs.; use 20 lbs.

# Jennings Pumps

THE NASH ENGINEERING CO 81 WILSON ROAD, SOUTH NORWALK CONN.

# Trade and Miscellaneous Notes

## Coming Events

**December 3-7, 1928.** Annual meeting of American Society of Mechanical Engineers, in New York. Headquarters at the Societies' Building, 29 West 39th St.

**December 3-8, 1928.** Seventh National Exposition of Power and Mechanical Engineering in New York. Headquarters at the Grand Central Palace.

**December 4-5, 1928.** Mid-year meeting of the National Warm-Air Heating Association in Buffalo, N. Y. Headquarters at the Statler Hotel.

**January 28-31, 1929.** Annual meeting of the American Society of Heating and Ventilating Engineers in Chicago, Ill. Headquarters at Edgewater Beach Hotel.

**February 12-16, 1929.** Fourth annual Midwest Power Engineering Conference and Exposition at Chicago. Headquarters at the Coliseum.

**April 9-11, 1929.** Sixth annual convention of the American Oil Burner Association in New York. Headquarters at the Hotel Pennsylvania.

**April 24-26, 1929.** Annual meeting of the National Warm-Air Heating Association in Chicago. Headquarters at the Hotel Stevens.

## Miscellaneous Items

**October building operations,** as reported by the F. W. Dodge Corporation, show the highest October contract aggregate on record for the 37 states east of the Rocky Mountains. The total was $597,103,500, a 3% increase over the September total of this year. Where comparisons were made with the October, 1927, records it was found that the only district in which there was a decrease was the Central West. Analysis of October contract total shows that 40% of all construction was for residential buildings, 25% for public works and utilities, 11% for commercial buildings, and 10% for industrial projects.

Contracts in New York State and Northern New Jersey amounted to $187,781,900, the highest October contract total ever recorded in this territory. This represents the largest monthly total on record since December, 1926. The increase was 12% over October of last year, and 21% over September of this year. The New England States report a contract total of $41,435,200, showing a gain of 44% over the October, 1927, record, but a decrease of 44% from the September total of this year.

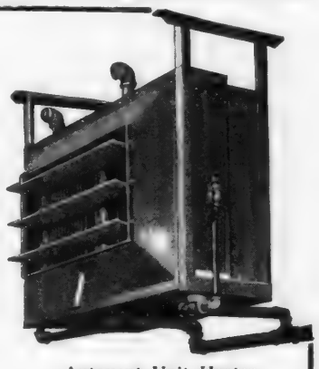
In the Middle Atlantic States construction contracts awarded during the past month represent the largest October contract total on record for this district, the total $77,784,500 was 18% over the September, 1928, record and 61% over the total for the same month of last year. Contracts in the Pittsburgh district amounted to $60,595,000, representing an increase of 7% over the October, 1927, record and a loss of 20% from the total for September of this year.

Contracts in the Central West, amounting to $154,412,500, show a gain of 11% over the September total for this year but there was a 21% decrease from the total for October, 1927. Northwest figures show a total of $9,555,800. This figure was 40% ahead of the total for September of this year, and 35% in excess of the October, 1927, total.

Construction contracts in the Southeastern States amounted to $51,128,300. This represents a 10% increase over the October, 1927, period, but shows a slight drop from the September total of this year.


# UNIFORM HEAT from AUTOVENT HEATERS

Autovent Heater suspended from roof joists. Adjustable deflectors at front of heater can be set to send air at any angle desired.



Autovent Unit Heater Ceiling Type

Modern method has done away with the necessity of mounting heating equipment on the floor where it takes up valuable space and interferes with plant operation.

Autovent heaters are still obtainable for floor or side wall mountings, but the standard unit is fitted with hangers for supporting it from the ceiling.

The disc fan on the Autovent heater sends the air over the coils through the heater at medium velocity and discharges it from a special tapered discharge at a velocity of 1000 feet per minute.

Air leaving an Autovent Heater has sufficient velocity to carry it from the heights of 20 to 30 feet diagonally across the room to the floor.

By the time it reaches the floor level it has been tempered by the colder air through which it passes so that there is little tendency for the heated air to rise towards the ceiling.

A natural circulation over all parts of the room is created and uniform temperatures are maintained.

REGISTERED AUTOVENT. TRADE MARK

AUTOVENT FAN & BLOWER CO.

1805-27 N. Kostner Ave., CHICAGO, ILL.

SEE OUR CATALOGUE IN SWEETS

The State of Texas had $14,410,300 in contracts which show an increase of 5% over the amount contracted for in October of last year. There was a drop of 5% from the September, 1928, total.

**Philippe Scherechewsky,** president, Cie Parisienne Chauffage Urbain, 72 Boulevard Haussmann, Paris, France, recently made a visit to the United States, particularly to study central station design, practice and operation. Between ten and twelve million dollars will be expended during the next year for the construction of a large central heating system in the business district of Paris, and Mr. Scherechewsky, whose company will carry out this project, expects it to be the most progressive example of district heating practice in the world.

## Manufacturers' Notes

**The Conco Valve Mfg. Co.,** Milwaukee, has appointed J. M. Lyons as its representative in the Metropolitan district to handle its line of temperature control valves for individual rooms. Headquarters will be at 280 Madison Ave., New York.

**Combustion Fuel Oil Burner Co.,** Milwaukee, has appointed Prossen-Meder Corp., 1834 Broadway, New York, as the distributor for the Combustion oil burner. There will be a warehouse at Bush Terminal, Brooklyn.

**Illinois Engineering Co.,** Chicago, has announced the appointments of the following sales representatives: W. N. Hisey, 711 Martin Bldg., Birmingham, Ala.; C. O. Miller Co., 822 Home Insurance Bldg., Little Rock, Ark.; Murphy Engineering Co., 607 North Scott St., Wichita Falls, Tex.

**Gulf Oil Burner Co.,** Philadelphia, has appointed M. A. Squier as sales manager succeeding S. Silvers. The Beaudette & Graham Co., 915 Boylston St., Boston, Mass., has been appointed distributor in the New England States, exclusive of Connecticut.

**Universal Pipe and Radiator Co.,** New York, has made a change in its directorate: James D. Rhodes is now a director as well as president; A. E. Ladoux is first vice-president, and Albert C. Lehman, Irving F. Lehman and George R. Rhodes have been elected to the board of directors.

**Copper and Brass Research Association,** New York, reelected R. L. Agassiz president at the eighth annual meeting.

**Gorton Heating Corp.,** 96 Liberty St., New York, has announced the appointment of C. Ellis Hayes to cover the Philadelphia territory with headquarters at 300 Commercial Trust Bldg., Philadelphia.

**Jenkins Bros.,** Montreal, has appointed J. S. Mock sales manager, a director of the company.

**Union Iron Works,** Erie, Pa., has appointed the Steel Boiler Sales Co., Land Title Bldg., Philadelphia, Pa., as representative in eastern Pennsylvania and southern New Jersey for the sale of its steel boilers.

**American Nokol Corp.,** Chicago, announces the appointment of R. Reilly, F. F. Stevenson and C. R. Lovejoy, as district sales representatives.

**Frank A. Holby Corp.,** New York, announces its removal to 101 Park Ave., and that the corporation name has been changed to the Holby Burner Corporation. The function of the new Holby Corporation for the time being will be to assist the Gulf Oil Burner Company in establishing its new industrial oil burner. This contract will be of a purely supervisory character. This corrects a slight error in a similar announcement in THE HEATING AND VENTILATING MAGAZINE for November.

**Wagner Electric Corp.,** St. Louis, has appointed H. N. Felton to be branch manager of the New York office. Mr. Felton graduated from the University of Illinois in 1917, and has been with the Wagner Corporation since the termination of the war. Previous to this appointment he was manager of the Milwaukee branch.

**Ames Iron Works,** Oswego, N. Y., has appointed Joseph A. Bohn general manager, to succeed James C. Gaskill who died recently.

**Direct Control Valve Co.,** Chicago, has appointed Fred D. Rollins as district manager of the Washington, D. C., branch, with offices at 909 and 910 Barr Building.

**Newport Boiler Co.,** Chicago, has increased its sales staff by the addition of Earle H. Fiigon, with headquarters at Elizabeth, N. J., who will cover southern New Jersey, and H. I. Bunton and E. H. Stickles, who will cover the northern New Jersey territory.

**American Radiator Co.,** New York, has announced the transfer of John J. Ney, manager of the St. Louis branch, to Boston, where he will act in the same capacity.

**Buckeye Blower Co.,** Columbus, O., has announced that it has acquired ownership of the building and three acres of land adjoining at 374-412 Dublin Avenue. The new premises will be occupied about January 1, 1929. The structure is four stories in height, 90 ft. x 310 ft. and a floor space of approximately 110,000 sq. ft. Immediate erection of an addition to the north is contemplated and the erection of a new boiler house and new foundry also is included in the expansion program.

**Burnham Boiler Corp.,** Irvington, N.Y., has taken over the building at 1038 South Kolmar Ave., Chicago, as headquarters for its western branch. Sales offices, showrooms and warehouse are combined in one building.

**Rome Brass Radiator Corp.,** New York, will handle the territory of Cleveland, Akron, Youngstown, Ashtabula and adjacent towns from its new sales office at 545 Leader Bldg., Cleveland, with Robert A. Wilson in charge.

**Consolidated Ashcroft Hancock Co., Inc.,** 338 Berry St., Brooklyn, N. Y., has moved its Chicago office to 605 West Washington Boulevard. This office also will house the staff of American Schaeffer & Budenberg Division, recently consolidated with the Hancock Company. G. A. Binz, formerly general sales manager of American Schaeffer & Budenberg Corporation, has been appointed sales manager in charge of the western industrial division with headquarters in Chicago. This division will handle the business of the company in that part of the United States and Canada, west of a line between Toronto, Ont., and New Orleans, La. A central repair and service department also has been established in Chicago, in charge of an instrument engineer.

**St. Louis Blow Pipe & Heater Co.,** 1948-60 North 9th St., St. Louis, Mo., has purchased Pecco, Inc., manufacturer of Pecco standard and lightweight unit heaters. By the addition of the designs, patents and machinery of Pecco, Inc., the St. Louis Blow Pipe & Heater Company widens the scope of the field which has been covered and rounds out its own service facilities for larger distribution. Present plans are for the addition of several sales agencies.

**York Heating and Ventilating Corp.,** Philadelphia, Pa., announces that H. P. Gant is now vice-president in charge of both heating and air-conditioning equipment sales. Mr. Gant has been vice-president of the company and general manager of the air-conditioning department. James A. Carey will continue as general sales manager. D. E. French, formerly general manager of the heating department, is vice-president in charge of production, engineering and research for both heating and air conditioning.

## Changes of Address

**Zephyr Washed Air Co.,** Minneapolis, Minn., announces its removal to 1126 Harmon Place.

**Trane Co.,** LaCrosse, Wis., has moved its Minneapolis office from 923 Nicollette Ave., to 210 South 10th Street.

**New York Air Valve Corp.,** New York, has moved its main offices to 478 Broome Street, where there will be better facilities for handling its line of heating specialties.

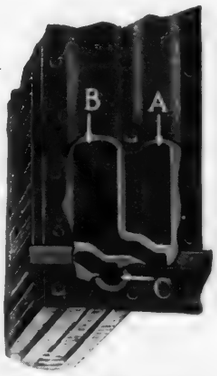
*Old-Timer:* "That's a pure copper case. Grinnell certainly does build top-notch stuff."

# The Old Timer Knows

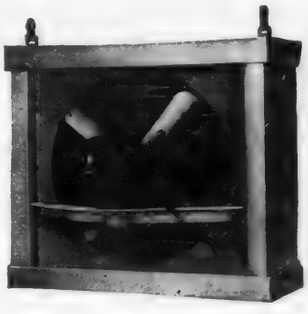
GOOD workmen appreciate well-made equipment and experienced pipe fitters recognize characteristic Grinnell quality and thoroughness throughout the Thermolier.

A unique feature is the header arrangement shown in cut at right. Steam entering chamber "A" passes into each of the U-tubes which form the core and is condensed by the air draft from the fan. The condensate flows first into chamber "B" and then through the two bottom U-tubes which form an *internal* cooling-leg into chamber "C". The latter, being in the air blast, is equal to a run of 100 feet of external cooling-leg piping, hence no external cooling-leg is required!

This feature, and the copper casing which covers the heavy steel framework, are only two of the 14 points of superiority which make the Thermolier stand out above unit heaters in general. May we send you a free booklet describing the other 12 points?—Use coupon.




*Above, unique header construction which, in combination with the internal cooling-leg, makes external cooling-leg piping unnecessary.*



*At left, rear view of complete Thermolier showing copper casing which protects heavy steel frame from moisture.*

# GRINNELL COMPANY

Executive Office: Providence, R. I.

*Branches in all Principal Cities*

## 14 Points of Superiority

GRINNELL COMPANY, INC.
208 W. Exchange St., Providence, R. I.

I want to read more facts about the Thermolier. Send along the booklet.

Name_____

Address_____

City_____

# Classified Advertising

**Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion, copy must be received not later than the 20th of the month preceding date of issue.**

**SALES REPRESENTATIVE WANTED**—An excellent opportunity with unlimited financial possibilities, either as direct salesmen or as sales representatives, is offered for the following territories:—No. Carolina, So. Carolina, Georgia, Alabama, Indiana and the Cleveland, Pittsburgh and Cincinnati territories, covering a complete line of vacuum, vapor and steam heating specialties, a complete system of temperature regulation, fans, air washers and unit heaters.

Only those with technical education and thoroughly experienced in one or more of the lines will be considered. Give complete history of selling experience with reference to territory covered, name of company now associated with, etc. Applications confidential.

THE BISHOP & BABCOCK SALES CO.
Cleveland, Ohio

**AIR CONDITIONING AND HEATING ENGINEER WANTED**—Must be a graduate mechanical engineer (age 28 to 30 years) and have had several years' experience with a fan company, architect, engineer or a manufacturer of heating or conditioning equipment. In reply applicant should give name of college, year of graduation, full details of experience, state salary expected and give references. Address Box 129, care of Heating and Ventilating Magazine.

**SALESMAN WANTED**—Heating salesman now selling jobbers to sell a line of standard packed radiator valves, manufactured by well-known and old established company. Address Box 125, care of Heating and Ventilating Magazine.

**District Manager**

for manufacturer of vacuum heating specialties and unit heaters with proven record desires similar position with progressive manufacturer of high grade heating and ventilating equipment. Address Box 128, care of Heating and Ventilating Magazine.

**TO SELL**

Modern cast-iron boiler foundry 60' x 250' (condition 100%) with R. R. Siding near Philadelphia. Equipped with:

4-Ton Electric Traveling Crane
Moulding Machines
Core Ovens
Electric Sand Mixer
1 Ton Electric charge floor elevator
63" Cupola
Air Hoists and Chippers
Sand Blast and Rumbling barrel
1 Ton Electric Hoist
Sanitary Washroom, etc.

Will contract for quantity castings at cost plus and supply our own equipment complete. Moulders and other help at hand. Liberal
Address Box 122, care of Heating and Ventilating Magazine.

**POSITION WANTED**—Estimator and construction superintendent thoroughly experienced in heating, ventilating, power and industrial piping desires to make change. Detailed information furnished on request. Address Box 1211, care of Heating and Ventilating Magazine.

**MANUFACTURER'S REPRESENTATIVE**—**Manufacturer of complete line of fans, air washers and unit heaters, desires recognized representative on commission basis. Address Box 123, care of Heating and Ventilating Magazine.**

**FOR SALE**—2 second-hand No. 10 Niagara Conoidal Fans. 1 No. 14 Niagara Conoidal Fan. Both type "N". Good condition. Address Box 124, care of Heating and Ventilating Magazine.

**VAPOR SPECIALTY REPRESENTATIVES WANTED**—Some territories open at present, particularly in the west and south. Good proposition for established men who have following with plumbing and heating contractors and architects. State territory and other lines handled. Layouts not necessary. We are an old established company. Our heating system is simple and popular. Communications held strictly confidential. Address Box 126, care of Heating and Ventilating Magazine.

## FOUND!
## Hidden Profits Uncovered

By simple investigation of trade details which is often called technical training. Let us help you reach out for the larger paying jobs that command the admiration of others. We furnish you a progressive program of investigation throughout the fall and winter for next spring's usefulness and profit. Our coaching is as good as private—it is personal, clear and direct to you. Come, write today about our methods for expanding your future opportunities. Full information is free.

- ☐ Heating and Ventilating Engineering
- ☐ Special Steam and Water Heating
- ☐ Plumbing Design and Installation
- ☐ Warm-Air Heating
- ☐ Contracting and Estimating
- ☐ Mechanical Drafting

**Saint Louis Technical Institute**
4541 Clayton Avenue St. Louis, Mo.

**POSITION WANTED**—Engineer experienced in the preparation of plans and specifications of heating and ventilating systems; also general mechanical equipment of buildings. Young man, married, good education. Capable of supervising mechanical equipment lay-outs. Address Box 1210, care of Heating and Ventilating Magazine.

**SALESMAN WANTED**—Heating salesman to sell vacuum vapor specialties in northern New Jersey. Must be experienced. Man living in territory preferred. Give details in letter which will be held confidential. Address Box 121, care of Heating and Ventilating Magazine.

**REPRESENTATIVES, ATTENTION!**

A very profitable connection can be offered a few well established sales organizations outside of the largest cities by one of the leading manufacturers of concealed copper radiators.

In replying please give full information including experience, lines handled and acquaintanceship with architects and the heating industry. Address Box 127, care of Heating and Ventilating Magazine.

# WALWORTH

Walworth Company, General Sales Offices: 51 East 42nd Street, New York
VALVES, FITTINGS AND TOOLS FOR STEAM, WATER, GAS, OIL AND AIR

Plants at
Boston, Mass.
Kewanee, Ill.
Greensburg, Pa.
Attalla, Ala.

# MANUFACTURED WEATHER

Carrier
AIR CONDITIONING AND DRYING EQUIPMENT

*makes*

**"Every day a *good* day"**
**Air Conditioning**

Humidification, Dehumidification
Centrifugal Refrigeration
Cooling of Public and Industrial Buildings
Temperature and Humidity Control

**DRYING AND PROCESSING**

**Carrier Engineering Corporation**

*Offices and Laboratories*
**NEWARK, NEW JERSEY**

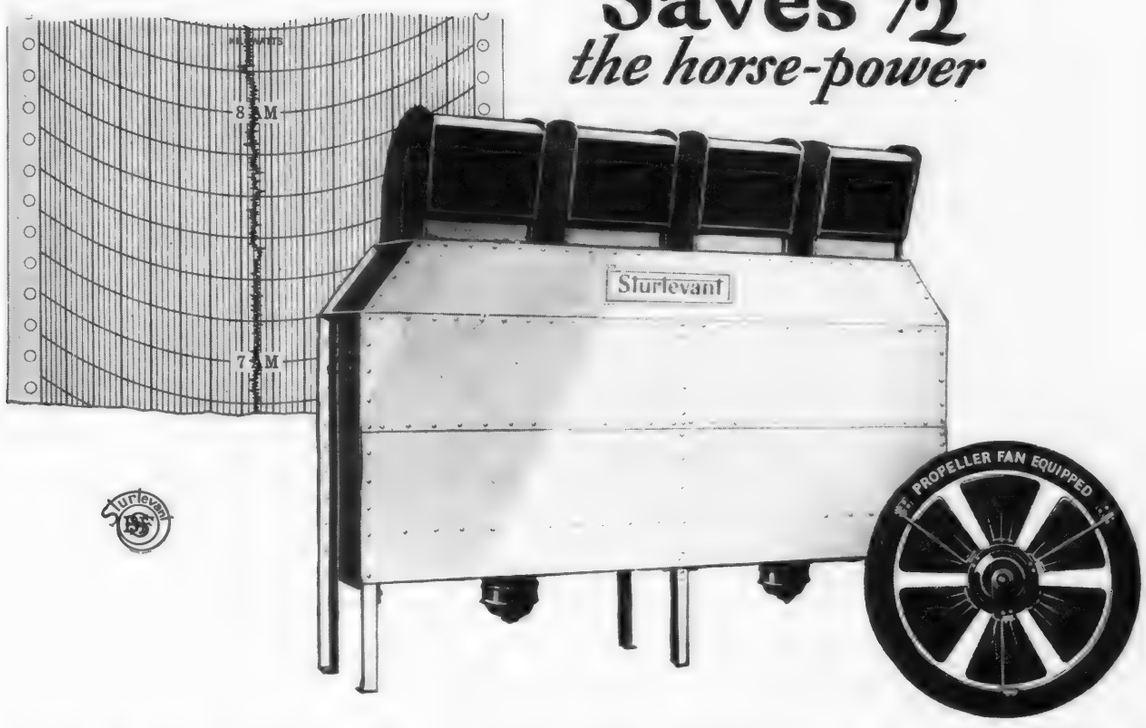
*See our detailed data in A. S. H. & V. E. Guide.*

**SALES OFFICES**

New York Philadelphia
Boston Chicago
Cleveland
Los Angeles
Kansas City
Washington

*Literature on request. Write concerning your specific problem.*

# Saves ½ *the horse-power*



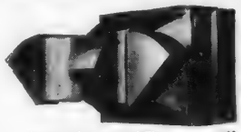

## You can *see* this Heater save the dollars!

***This Unit Heater effects a saving of 50% in current through the use of propeller type fans instead of centrifugal fans***

BY the common-sense application of propeller type fans to "Tempervane" Heating Units, Sturtevant Engineers considerably cut the cost of industrial heating. It does not need the judgment of a Solomon to recognize what this economy means—you simply check the current consumption curve!

For any air delivery or B. T. U. capacity Sturtevant propeller fans require motors only one half the horsepower of those used in similar heating units equipped with housed centrifugal type fans . . . it means motor horsepower is cut 50% and current consumption is halved!

A 50% saving in current consumption is a worth-while saving—it deserves investigation! Write our nearest office for indisputable evidence of Tempervane economy—complete information, test photographs, performance curves, etc., will be promptly furnished . . . gratis.



*Suspended type "Tempervane"*

Tempervane Heating Units are made in both floor and overhead types—for steam pressures up to 350 pounds per square inch.

B. F. STURTEVANT COMPANY

*Plants and Offices at:* Berkeley, Cal. ⟷ Camden, N. J. ⟷ Framingham, Mass. ⟷ Galt, Ontario ⟷ Hyde Park, Mass. ⟷ Sturtevant, Wis.

*Branch Offices at:* Atlanta; Birmingham; Boston; Buffalo; Camden; Charlotte; Chicago; Cincinnati; Cleveland; Dallas; Denver; Detroit; Hartford; Indianapolis; Kansas City; Los Angeles; Milwaukee; Minneapolis; New York; Omaha; Pittsburgh; Portland; Rochester; St. Louis; San Francisco; Seattle; Washington, D. C.; *Canadian Offices at.* Toronto, Montreal and Galt.

*Also Agents in Principal Foreign Countries.*

**Sturtevant** REG. U.S. PAT. OFF. *Tempervane* **Heating Units**

# THE AEROFIN CORPORATION

ORIGINATORS OF
STANDARDIZED LIGHT-WEIGHT
FAN SYSTEM HEAT-SURFACE

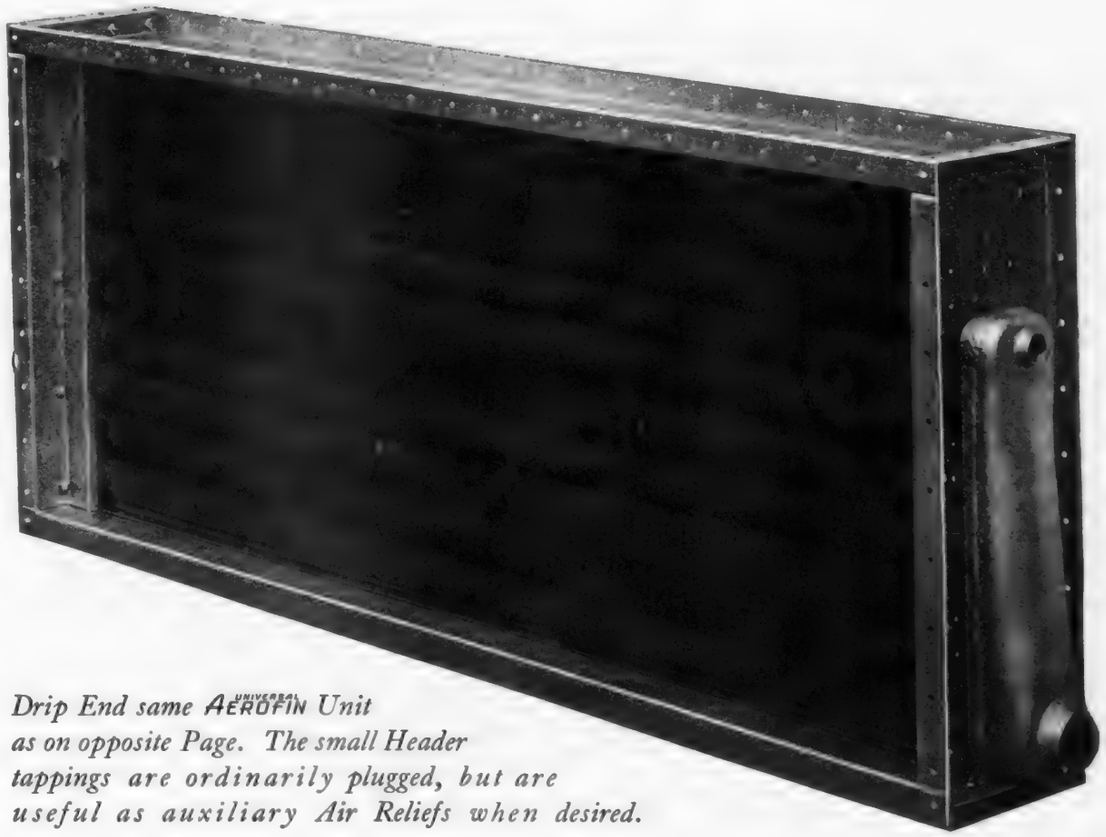
ANNOUNCE

UNIVERSAL
# AEROFIN

FOR

PRESSURES FROM 2½ TO 150 LBS. GAUGE

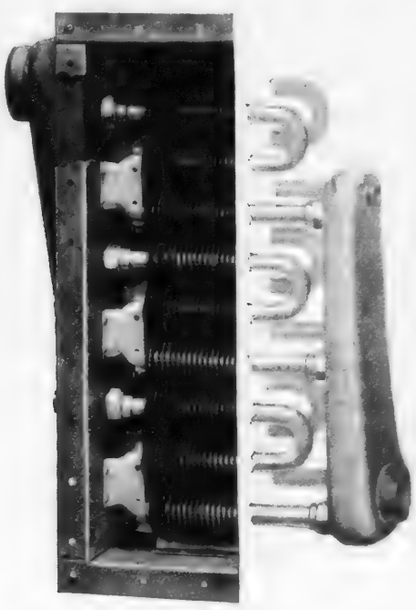
*Supply End, Two-Row Unit* UNIVERSAL AEROFIN *having tubes 4'-0" long. Casing* AEROFIN *standard, same as* LOW PRESSURE AEROFIN *and* HIGH PRESSURE AEROFIN, *with Headers external.*



*Drip End same* AEROFIN *Unit as on opposite Page. The small Header tappings are ordinarily plugged, but are useful as auxiliary Air Reliefs when desired.*

AEROFIN, the latest addition to the AEROFIN family,—complementing AEROFIN and AEROFIN, of which more than eleven million feet are in service,—provides a standardized, non-corrosive, light-weight, compact, self-encased Unit Heat-Surface having every characteristic AEROFIN advantage and usable for the whole range of pressures between 2½ and 150 lbs. gauge.

In AEROFIN the heat-surface is a continuous seamless copper tube bearing the proved AEROFIN helical, crimped extended surface, made metalicly integral with the tube. The tubes are bent into a three-pass coil, ends opposite, as indicated at the left, the upper end of the tube being connected to the die-stamped, welded Supply Header, the lower to the Drip Header, these connections being made by means of special brass compression unions, forming absolutely tight, dependable connections. A set of three three-pass coils mounted one above the other constitutes a "row of tubes." AEROFIN is designed for installation with tubes horizontal only. It is made in one-row or 2-row Units, in 17 standard tube lengths, between 2 ft. 0 in. and 10 ft. 0 in., inc., in increments of 6 in.



Bulletin U-8, containing complete data, including 4-color piping diagrams, will be forwarded promptly upon request to Newark.

***Whatever you've wished for in a Fan System Heat-Surface you'll find in Aerofin!***

## AEROFIN CORPORATION

Burnham Building CHICAGO — 850 Frelinghuysen Avenue, NEWARK, N. J. — 39 Cortlandt Street, NEW YORK — Oliver Building PITTSBURGH

Land Title Building, PHILADELPHIA — Paul Brown Building, ST. LOUIS

AEROFIN *For Pressures up to 50 lbs. Tube-Plate Construction*

[ *Aerofin is sold only by Manufacturers of nationally advertised Fan Heating Apparatus* ]

AEROFIN *For Pressures from 25 to 350 lbs. Continuous Seamless Tubes*

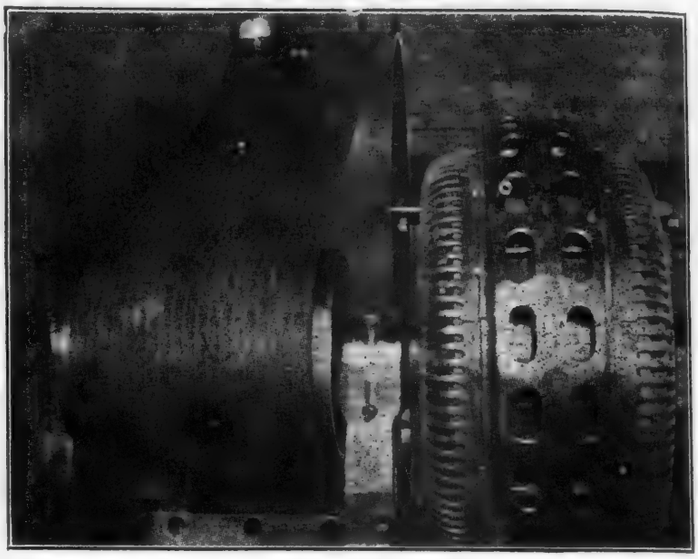
*Booth 269-70—New York Power Show—Dec. 3 to 8*

# TENTACULAR

## For Higher Efficiency in Power Transmission

Illustration shows a typical example of "Tentacular" performance 400 H.P. fan drive on 10 ft. centers. It would cost twice as much as Tentacular to operate such a drive with other systems of power transmission and still the efficiency would be less.

**Ventilating Engineers, do not fail to visit our booth at the New York Power Show.**



Alexander Brothers, Inc.
**14 South Street, PHILADELPHIA, PA.**
**Branch Offices and Distributors in all principal cities.**
**Established since 1867.**

**Sole Makers of Tentacular Transmission Belting**

## "Where there's smoke....."

The selection of the G.A.F. Automatic Filter for a fast growing preponderance of air cleaning installations, indicates more accurately than anything else, the recognition which this *100% automatic* filter has won among Architects and Engineers everywhere.

Included among the more recent selections are the two largest air cleaning undertakings so far attempted, the latest providing for the cleaning of over a million and a half cubic feet of air per minute.

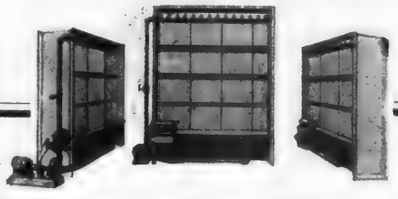
*"Where there's smoke, there is fire."* The definite preference that has grown up for the G.A.F. Automatic Filter has many good reasons back of it. And they are clearly defined, starting with better engineering and greater ingenuity in design and ending with markedly superior performance in service.

It is impracticable to record the details of these reasons here. But they are fully and clearly set forth in a new illustrated bulletin, designed for easy reading. Every Architect, Engineer, Contractor, and Business Executive who is in any way interested in air cleaning, should read a copy and have it in file. A copy will gladly be mailed on request. Write for one—when you take care of your correspondence today.

**General Air Filters Corp.**
Division The W. B. Connor Co. Inc.
**369A Lexington Ave., New York**

***Manufacturers of Air Cleaning and Conditioning Equipment, Air Filters, Air Washers, Spray Nozzles***

**Typical large G.A.F. Automatic Air Filter installed at the Lincoln Hotel, one of the newest and largest in New York. Normal capacity of this unit is 105,000 C.F.M.**



**Typical installation of small G.A.F. Automatic Filters. 3 Units at the Manufacturers & Traders Trust Co., Buffalo, N. Y. Total capacity—50,000 C.F.M.**

# *The* BUILT-TO-ORDER HEATING UNIT FOR LARGE INDUSTRIAL AREAS

HEAT WITH UNIT HEATERS

SIROCCO UNIT HEATERS are made in 28 sizes and capacities —for floor and ceiling applications.

# *The Sirocco Unit Heater*

Built like a battleship to withstand all the ordinary abuses of the shops . . . Sirocco Unit Heaters . . . in either floor or ceiling types . . . can be placed anywhere, and they will force heated air everywhere. Simple . . . accessible . . . scientifically "right" . . . Sirocco Unit Heaters put "waste heat" to work . . . reduce "heat loss" to a minimum . . . ventilate as they heat (or can be used for either heating or ventilating alone). Send for our beautifully illustrated 32-page book on Industrial Heating and Ventilating —contains a complete description of the Sirocco Unit Heater. Mailed *free* on request. (823)

**American Blower**

"Sirocco" VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

AMERICAN BLOWER CORP., DETROIT, MICHIGAN
CANADIAN SIROCCO CO., LTD., WINDSOR, ONTARIO
*BRANCH OFFICES IN ALL PRINCIPAL CITIES*

COUPON

Please send me your 32-page book on Industrial Heating and Ventilating

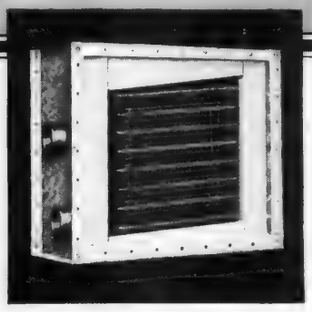
*Name*_____

*Firm*_____

*Full Address*_____

# YORK SUPER-FIN

1 No joints to leak
2 For high or low pressure
3 Drainage pitch in tubes
4 Expansion and contraction strain between tube and header eliminated
5 Supply and return at same end
6 Units can be set end to end
7 Smooth fins—less dirt
8 Helical fins embedded in tube—three-side contact



YORK SUPER-FIN blast radiation (no joints to leak) has come to be recognized as an outstanding advance in extended surface copper coil units. Read the list of its exclusive advantages and you will see why. For further information, write York Heating & Ventilating Corp., 1539 Sansom Street, Philadelphia.

YORK SUPER-FIN RADIATION

**York Heating & Ventilating Corp'n**
PHILADELPHIA
*Engineered Products*
Makers of the Famous York Heat-Diffusing Unit

# TURTLEBACK
TRADE MARK

## Free Flow of Fresh Air

This alone should be sufficient reason for installing *any* ventilating product, but architects, engineers and contractors know that **TURTLEBACK** possesses all the necessary qualifications that a good ventilator should have—namely, sturdy construction, unobstructed air passage as well as simplicity in installation and in adjustment.

**Install TURTLEBACK once and it will be TURTLEBACK always**

**VENTILATING PRODUCTS CO.**
2800 Cottage Grove Ave., Chicago, Ill.

# For Heating and Ventilating Use

## ATTENTIONLESS

For unit heaters, exhaust fans, blowers, etc. Emerson Motors provide almost attentionless service.

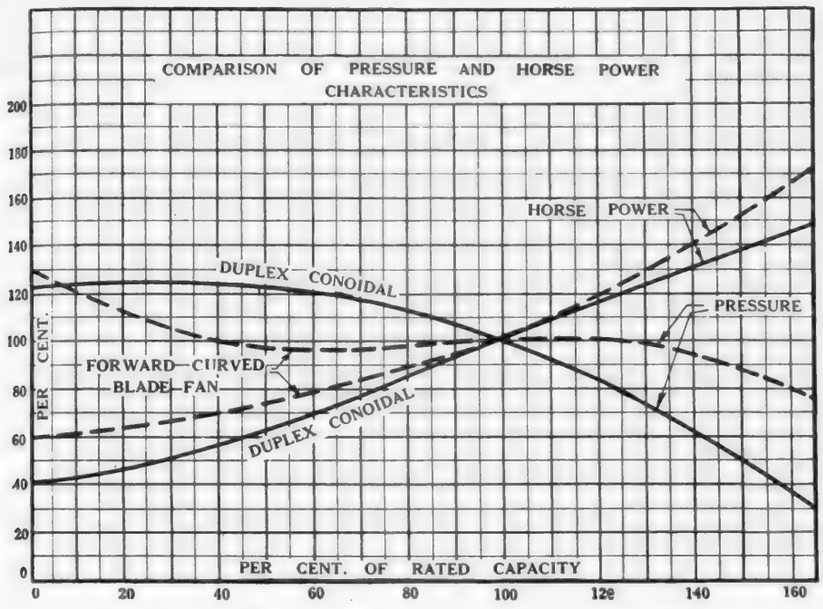
They are cool-running with a temperature rise not to exceed 40° C. Extra large oil wells (with wool pack or oil ring lubrication) carry a normal year's oil supply, eliminating frequent re-oiling. Shafts and bearings are liberally proportioned and made to special analysis to provide maximum bearing life.

**The Emerson Electric Mfg. Co.**
2018 Washington Ave., St. Louis, Mo.
806 W. Washington Blvd., Chicago, Ill.
50 Church St., New York City.

# EMERSON
MOTORS
*and* FANS

# "DUPLEX" STABILITY

## Versus the Temperamental "Forward Curve"



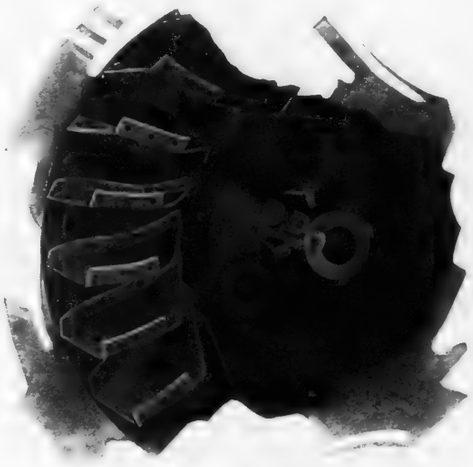

Modern double curved Duplex fans will deliver the desired air capacity even if the resistance is somewhat different than specified, and the horsepower will not vary to any extent. The rising pressure characteristic and flat horsepower curve is responsible for this good performance. (Study the curves.)

The inherent characteristics of all forward curved blade fans (drooping pressure and sharply rising horsepower performance) render them sensitive to slight variation in existing resistance, with the result that under such conditions they are subject to temperamental air delivery and greatly increased power consumption.

Assume 20% actual drop in pressure on a fan system. With the forward curved blade fan the capacity will increase approximately 60% and the *horsepower rise* 65%—the Duplex will increase 25% in capacity, but with only 20% *rise in horsepower.*

Specify Buffalo Duplex fans and feel assured of obtaining full air quantities specified without requiring oversize motors and large range of speed control.

Result—low cost and satisfied clients.



**Partial View of "Buffalo" Duplex Conoidal Fan Wheel**

## Buffalo Forge Company

**480 Broadway, Buffalo, N. Y.**

**In Canada**
**Canadian Blower & Forge Co., Ltd., Kitchener, Ont.**

## in Cast Iron

The Leader Is

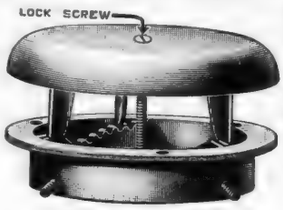
View of Bottom Casting

# Nu-Notch

REG. U.S. PAT. OFF.

## MUSHROOM VENTILATOR

Preferred by architects and engineers because it is Simple, Rigid, and easily adjusted in RECESSED NOTCHES that assure permanent adjustment. Can be used for any kind of floor. Also *flat tops* for low seats, and steel ring for sleeve.

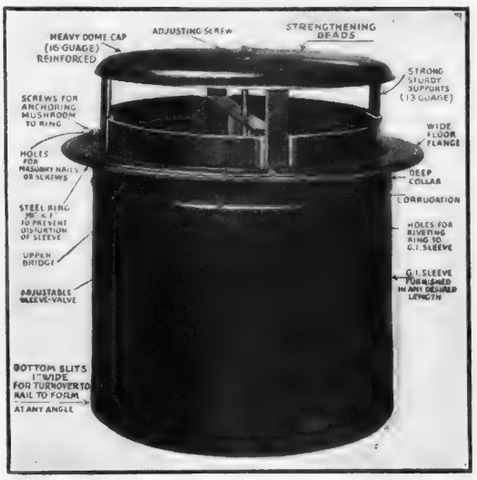



Pat. Aug. 7, 1928

## in Steel

MUSHROOM AEROVALVE AIR DIFFUSER

*Made of Heavy Steel*


HEAVY DOME CAP (16 GUAGE) REINFORCED
ADJUSTING SCREW
STRENGTHENING BEADS
STRONG STURDY SUPPORTS (13 GUAGE)
SCREWS FOR ANCHORING MUSHROOM TO RING
WIDE FLOOR FLANGE
HOLES FOR MASONRY NAILS OR SCREWS
DEEP COLLAR
CORRUGATION
STEEL RING TO PREVENT DISTORTION OF SLEEVE
HOLES FOR RIVETING RING TO G.I. SLEEVE
UPPER BRIDGE
G.I. SLEEVE FURNISHED IN ANY DESIRED LENGTH
ADJUSTABLE SLEEVE-VALVE
BOTTOM SLITS 1" WIDE FOR TURNOVER TO NAIL TO FORM AT ANY ANGLE

Stronger than cast iron; will sustain many times the weight to which it is ever subjected. AEROVALVE is quickly installed, easy to regulate, and low in price. Sold with or without sleeve.

**Made By the Makers of the DISC-LOC Gallery Riser Vent and the TU-WAY Air Deflector**

**KNOWLES MUSHROOM VENTILATOR CO., 202 Franklin St., New York City**

## We Want Dealers

### *Heating Contractors*

**Do Big Business** by Installing our **Baked Enamel Shields** and **Art De Luxe Cabinets,** as every radiator installation means a ready and almost **Certain Prospect** for the **Sale** of our **Shields** or **Cabinets.**

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Continually specify and recommend our **Splendid Line** because **Circulation is Not Retarded** on **Account** of our **Construction** which permits of **Ready Circulation** of **Both Cold** and **Hot Air.**

**Write for Prices and Dealer Agreement.**

**ACME RADIATOR SHIELD CO., Inc.**

***Manufacturers of "Modern" Radiator Furniture***

**48 and 50 Vine Street** **Cincinnati, Ohio**

## THERMOSTATIC METAL

**The most accurate, constant and durable of expansion units**

**FOR LOW AND HIGH TEMPERATURES**

**Our No. 1800 metal for temperatures up to 450° F.**
**Our No. 2800 metal for temperatures up to 1500° F.**

**Positive and Dependable Thermostatic Metals**

**W. M. CHACE VALVE COMPANY**
**1600 Beard Avenue**
**Detroit, Michigan**

## Phillips Self-Drilling Expansion Shells

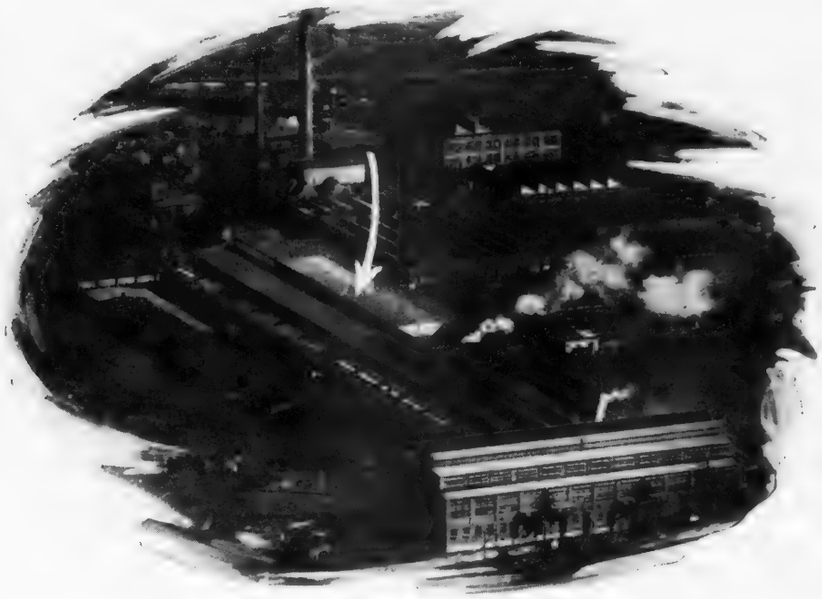
***Every Shell makes its own Hole***

For use in ceilings, walls, floors and beams for fastening pipe hangers, etc., and for bolting timbers and other equipment to concrete and stone. It has internal U. S. Standard Threads for rods, bolts and screws.

Quickly installed with the PHILLIPS SPRING HAMMER or by hand. No DRILLS are required.

**PHILLIPS DRILL CO., 1537 Cortland St., Chicago, Ill.**

# Job No. 5367, on which Skinner Brothers saved the plant owner thousands of dollars on heaters—just another of 6129 recorded cases.



## Skinner Bros. saved owner of this building $22,650 on heaters

This owner's cost for heating equipment was held to $13,200 when costs on other types proposed ran from $35,850 to $47,750. A saving of at least 63% over the next-to-lowest cost.

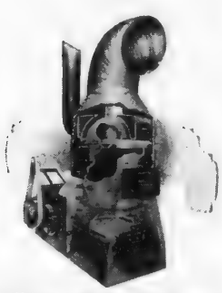
In a very brief discussion, a Skinner Man can cite such a great volume of cases where big savings have been made that you will realize that *no one can afford to permit a decision on heating specifications without considering Skinner Brothers' figures.* There is a Skinner Man near you. Call him in or write us for either further information or estimate.

It would seem that such large savings in so many cases could not be made without sacrifice to heating results or heater durability. Yet Skinner Brothers protect every owner with a *guarantee* to heat his building to specifications or to take back the heaters. As evidence of their durability, Skinner Heaters installed over 25 years ago are still in use and give every indication of lasting as long as the buildings which they heat.

*Skinner Brothers "Baetz Patent" Air Heater.*

It is not difficult to understand why Skinner Brothers can accomplish such results. Since originating the Unit Method of heating, over a third of a century ago, Skinner engineers have adapted it to every imaginable kind of heating problem in all different types of buildings—over 8000 installations.

With this vast accumulation of experiences to draw upon, the Skinner man is able to keep the owner's cost to an absolute minimum and still guarantee 100% results. Under such conditions, substantial savings are practically inevitable.

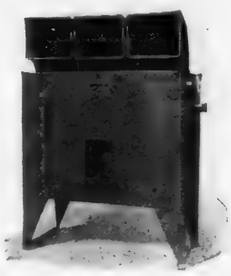


*"Direct-Fired" Air Heater*

## Skinner Bros. Air Heaters

SKINNER BROTHERS MANUFACTURING CO., INC., ST. LOUIS
1470 S. VANDEVENTER AVENUE - NEW YORK OFFICE, 1710 FLATIRON BLDG.

**8107 competitive jobs prove Skinner Bros. save owners *big* money on heaters 3 times out of 4.**

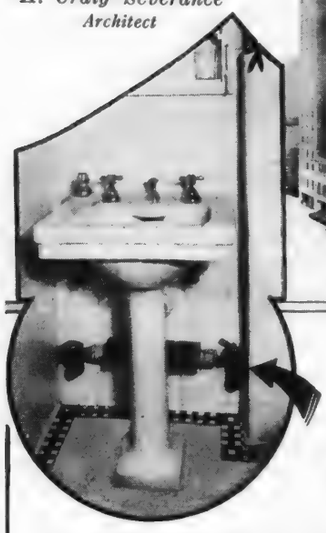


*Type "U" Air Heater*

*Another well known Building is equipped with* CONVECTO BATHROOM RADIATORS

HOTEL MANGER *in which are included the entrances to the* ROXY THEATRE

*H. Craig Severance*
*Architect*

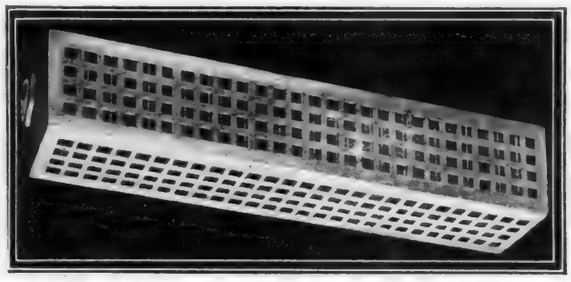


*Typical Convecto Bathroom Radiator Installation. Compact — Efficient — Good Looking. Can be enclosed in attractive cover or concealed in wall. Light and easy to install.*

# CONVECTO
## BATH ROOM
# RADIATOR
*"The Handsome Heating Unit"*

We are proud to announce, due to successful tests and increased manufacturing facilities, a reduction in price on the complete line of CONVECTO RADIATORS. Write us for full particulars.

**METAL STAMPING CO.**
*Established in* 1872
**13th to 14th Street—East Ave., Long Island City, N. Y.**
**Makers of Artone Radiator Enclosures**



**Made in 5 standard sizes. Furnished with or without well made removable cover of lattice design—in white or colors to match bathroom.**

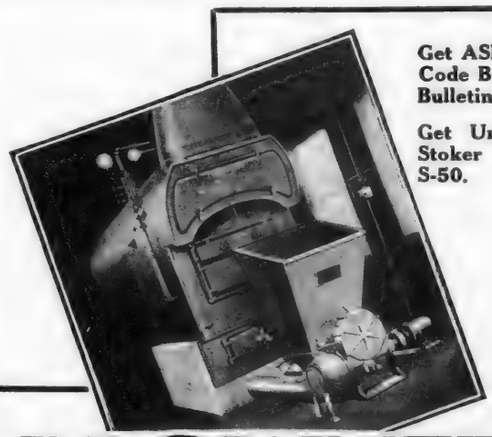
# And Now . . .

For satisfactory domestic water heating results, architects and heating engineers have found nothing to equal the *below boiler water line installation*—especially as exemplified in the use of the Paracoil Storage Water Heater.

Performance data, dimensions and piping diagrams gladly furnished upon request.

**DAVIS ENGINEERING CORP.**
**90 West St., New York City**

# Paracoil
## WATER HEATERS



**Get ASME Code Boiler Bulletin B-6-A.**

**Get Underfeed Stoker Bulletin S-50.**

# BROWNELL
## *Boilers and Stokers*

**BROWNELL BOILERS** have been on the market 73 years and are sold all over the world. Full line, all latest features.

**BROWNELL AUTOMATIC UNDERFEED STOKERS** will save from 15 to 50% on fuel bills and firing expense. Will improve combustion by utilizing the heat units in the coal and gases that escape as smoke when you fire by hand. Will deliver hotter fire on LOWER GRADES OF COAL AND LESS OF IT.

Stop wasteful hand-firing. Install a BROWNELL AUTOMATIC UNDERFEED.

***A representative near you***

**The Brownell Company, Dayton, Ohio**

*Be sure to visit our exhibit at the Power Show and see DeBothezat Pressure Fans of exceptional merit. Grand Central Palace Booths 555 and 556 December 3rd to 8th*

# De Bothezat Disc Fans

## High Efficiency at either High or Low Pressures

**Large Air Volume—together with High Static Pressure Characteristics are a few of several qualities which distinguish De Bothezat Disc Pressure Fans.**

**42" Disc Pressure Fan**

*5 H.P. 850 R.P.M.*
*1¼" Static Pressure.*
*Volume 12,000 C.F.M.*

*Manufacturers of both blowers and fans emphasize the fact that, at low pressures, disc fans require materially less power.*

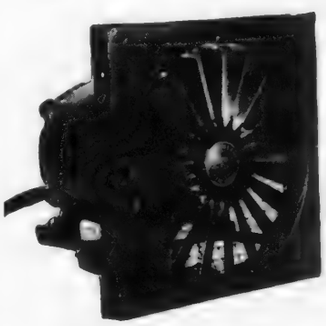
**De Bothezat Disc Fans have non-overloading power characteristics and thus** *work with equally high efficiency at high and low pressures.*

**30" Disc Pressure Fan**

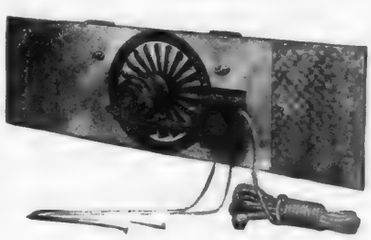
*2½ H.P. 1140 R.P.M.*
*1" Static Pressure.*
*Volume 8000 C.F.M.*

## DE BOTHEZAT IMPELLER CO., Inc.

**1922 Park Avenue, New York City**

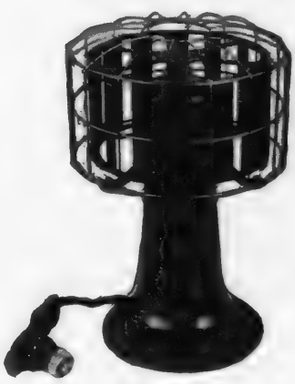


**Forced Draft**
**High Pressure Blower**



**"Little Imp"**
**Residential Kitchen Fan**

*Due to static pressure produced by this fan it will not only remove the cooking odors from the kitchen but will also ventilate the rooms adjacent to the kitchen.*



**Desk Fan**

*Gives agreeable cooling and does not blow the papers off the desk.*

**Bifurcator**

*For special ventilating jobs where fumes of excessive temperature or corrosive character are to be removed.*

# Stores, Workrooms and other Small Spaces

may now have the advantage of

# TWINFAN
## UNIT HEATING

through the new
Type "V" TWINFAN

Every feature of the famous improved Twinfan Unit Heater (for large installations), every advantage and convenience, adaptability and durability, have been carried out in the design and construction of the new Type "V" (small units).

Twinfan famous light weight copper radiator with screwed ground joints (an exclusive feature with the Twinfan, the perfection of which has enabled many of the more important improvements and refinements of Twinfan Heaters) have been adapted to the new type "V".

*Complete details and information are contained in Bulletin number 215, which will be sent on request.*

DWYER EQUIPMENT CO.
4534 W. NORTH AVE. CHICAGO, ILL.
HEAT WITH TWINFAN UNIT HEATERS



# At.....

the New York
Power Show
see Duriron
acid-proof
exhaust fans
at Booth Six

Also Alcumite
sheet for
ducts carrying
corrosive
fumes

Get Duriron
Bulletin No. 140-B
giving
complete
technical data
on Duriron
Exhaust Fans

Duriron
and Alcumite
are made only by
The Duriron
Company
Dayton Ohio

*"Heat with Unit Heaters"*

# COMET UNIT-HEATERS

# *Will Operate Efficiently at* ANY *Steam Pressure!*

COMET Unit Heaters contain no cast, soldered or brazed materials. With their sturdy welded construction they are not affected by air-bound pounding, waterlogging or freezing. Every one is tested under hydrostatic pressure and guaranteed to withstand unlimited steam pressure.

Comet Unit Heaters will also resist rust, corrosion and oxidation for the *lifetime of the entire heating system.*

The scientific design and construction of the tubes give unusually large heating surface.

Comet Unit Heaters are furnished in both overhead and floor mounted types in several sizes to meet every building requirement.

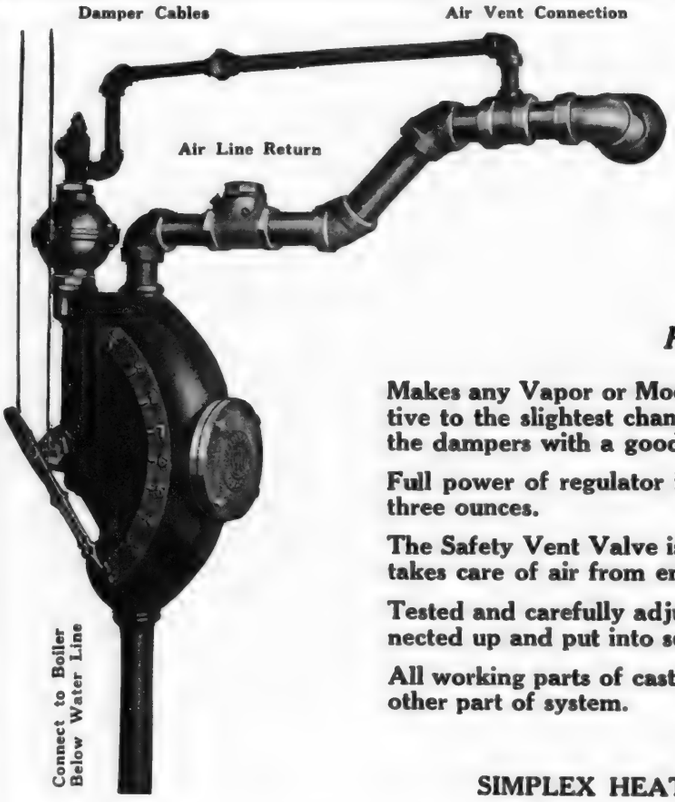
*Send for Bulletin* 105 *showing guaranteed performance at various pressures*

Fans · · Blowers
Unit Heaters ·· Air Washers
Furnaces

**NEW YORK BLOWER COMPANY**

*General Offices:*
3151 SHIELDS AVENUE
Chicago

REPRESENTATIVES IN PRINCIPAL CITIES




Wiley

# Safety-Vent Vapor Regulator

***POWER IS ITS MIDDLE NAME***

**Makes any Vapor or Modulating System safe and satisfactory. Sensitive to the slightest change in pressure. Has ample power to control the dampers with a good working margin.**

**Full power of regulator is exerted within a pressure range of two or three ounces.**

**The Safety Vent Valve is a distinguishing feature of this regulator and takes care of air from entire heating system.**

**Tested and carefully adjusted before leaving factory, ready to be connected up and put into service, with the least trouble and expense.**

**All working parts of cast bronze. Will last as long as the boiler, or any other part of system.**

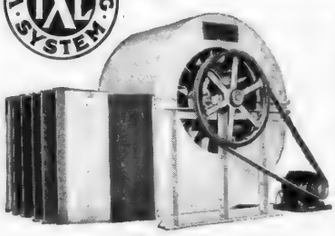
***Write for details***

**SIMPLEX HEATING SPECIALTY COMPANY, Inc.**
**LYNCHBURG, VA.**

# Lakeside

VENTILATING IXL SYSTEM

## Quiet *Electric Ventilator*



An electric ventilator that fills a long felt need—efficient and quiet in operation.

Easy to install—requires no tearing down of walls or ripping of floors.

**Write for catalog.**

LAKESIDE COMPANY, 107 Main St., Hermansville, Mich.

H&V12-Gray

## The TooPas Air Filter
## *cleans the air twice*

BASED on the time tested principles of the Phoenix filter, the new TooPas insures high cleaning efficiency and the elimination of oil entrainment. Sectional construction fits any wall opening. *Send for the Bulletin.*

NATIONAL AIR FILTER COMPANY

*5130 Ravenswood Ave., Chicago, Ill.*

# KAUFFMAN

AIR DIFFUSERS

**SINCE 1908**

## Kauffman Air Diffusers

HAVE BEEN IN USE IN

**Some of America's Finest Theatres**

*Simple to Install—Low in Price*
*Graduated Air Control*

**AMERICAN METAL PRODUCTS CORP.**
**ST. LOUIS, U. S. A.**

# Never a mistake . . . to install the hiJet

For the economical distribution of heat in
Factories
Railroad Shops
Roundhouses
Warehouses
Mills
Garages
Gymnasiums
and all industrial buildings, as well as in special process rooms where uniform heat maintenance is required.

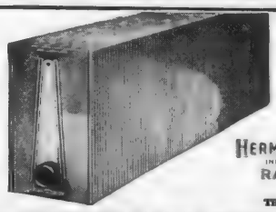
Built by heating specialists with a background of over 20 years of practical heating experience in commercial and industrial buildings everywhere, the hiJet heater has many features of particular interest to all engineers and contractors.

The hiJet has established a new principle, practical and sound in plant heating. It forces a jet of warmed air downward with sufficient velocity to dispel the cold air strata at the floor line, resulting in a constant uniform and comfortable temperature.

The Herman Nelson indestructible radiator has no joints of any kind—there is no possibility of leaks. Its construction assures free steam circulation and condensation drainage. It is guaranteed to withstand steam working pressures up to 150 lbs.—indefinitely.

Manufactured in three sizes—all easy to install—the hiJet meets all requirements for space heating. Backed with a sound reputation for success among leaders of industry—it offers a wide range of possibility and profit for the heating contractor.

To learn the facts send for new catalog giving complete information. Fill in the coupon below—mail it today.



*This radiator makes the difference*

HERMAN NELSON INDESTRUCTIBLE RADIATOR TRADE MARK

*F. Wesel Manufacturing Company, Scranton, Pa.*

*Manufactured only by* THE HERMAN NELSON CORPORATION, *Moline, Ill.*
*Builders of Successful Heating and Ventilating Equipment for Over 20 Years*

*Sales and Service*

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The HERMAN NELSON hiJet TRADE MARK HEATER

GET FREE BOOK

THE HERMAN NELSON CORPORATION
*Moline, Illinois*

Gentlemen:
Please send me book No. 12 containing the facts about the Herman Nelson hiJet Heater.

*Name*..... *Firm Name*.....

*Address*..... *Type of Building*.....

How Bright —Is Right?

You can pick out a Wolverine tube by its brightness—it is *clean*, outside and inside—nothing less. Depend on Wolverine craftsmanship.

We want to quote where quality counts

WOLVERINE TUBE CO.

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**386 FOURTH AVE., NEW YORK**

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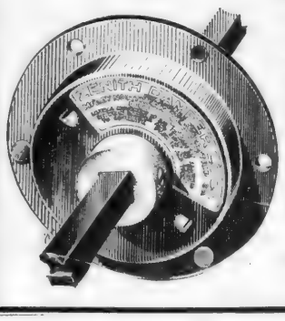

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# WING FEATHERWEIGHT

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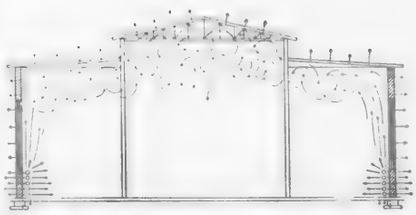

*Heated air banks up overhead and heat dissipates through your roof.*

MOST heating systems in large buildings require the maintenance of a large volume of highly heated air overhead in order to keep the floor level warm at all. For air heated at the floor level rises at once. You must depend on partly cooled air from above, displaced by the rise of newly heated air, to warm your workmen.

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Wing Heaters thus offer you both economy and an even distribution of heat. They combine, in one system, all these advantages:

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2. Heat is *immediately* effective, because it is circulated instead of banking up under your roof. This means a warm plant in the morning.
3. Wing Heaters are *featherweight*. They can be installed overhead in any type of building. Steam lines are overhead.
4. Each Wing Unit Heater can be regulated independently.
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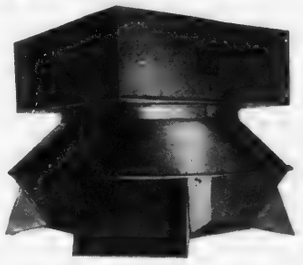
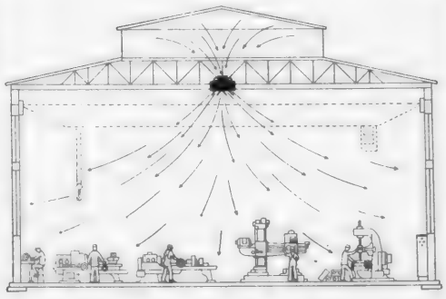


*Wing Featherweight Low Ceiling Type*



*Wing Units overhead direct heated air downward.*

*Wing Featherweight High Ceiling Type*

# UNIT HEATERS

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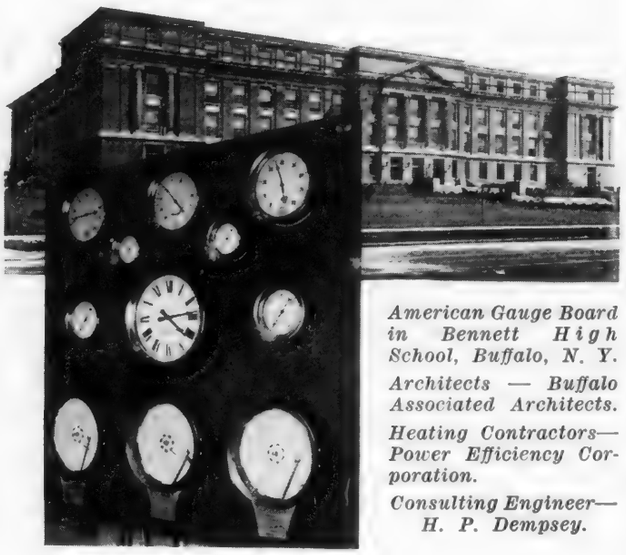

*American Gauge Board in Bennett High School, Buffalo, N. Y.*
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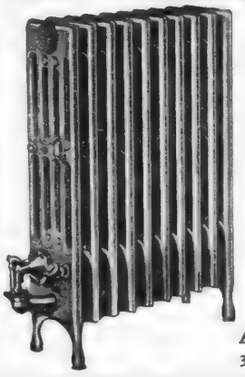

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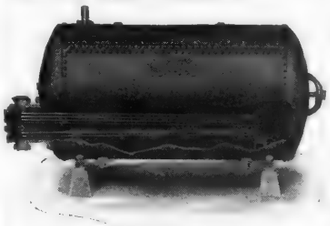

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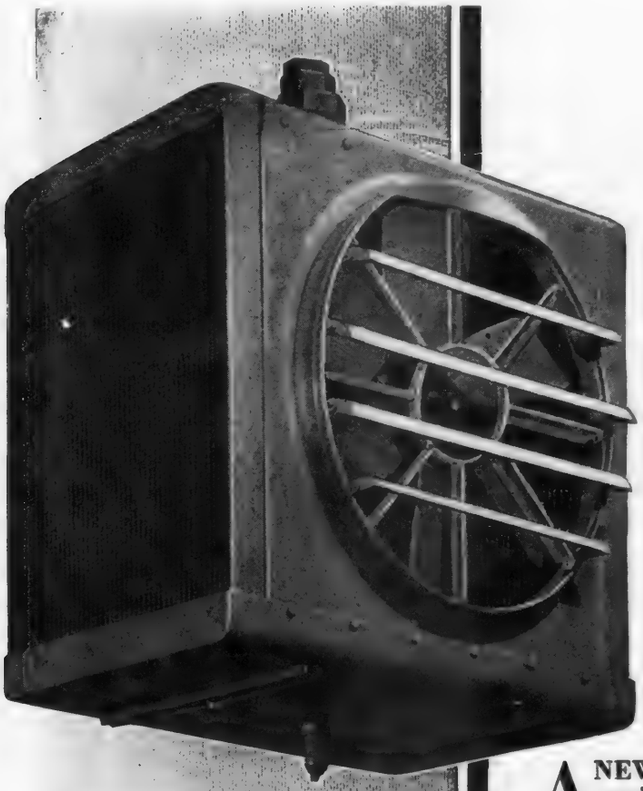
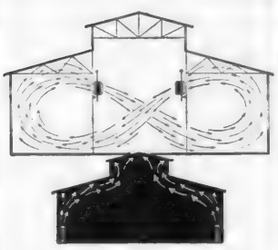


**Model 1401**
The new Modine Unit—equivalent of 1300 ft. of c. i. radiation — weighs only 300 lbs.—suspends from the steam line.



A comparison of the Modine method with cast iron radiation. Note above how the Modine delivers the heated air down and keeps it there. Below, the course of heated air with cast iron radiation — the roof of the building is heated first.

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## *This larger Unit Heater with all the features of smaller models—*

**A NEW Modine — Model 1401 — the equivalent of thirteen hundred square feet of cast iron radiation—with all the outstanding features for heat directional control found in smaller Modines.**

**Consider the economies this new unit effects. Space saving—four tons of cast iron occupy considerable floor and wall space; the 1401 Modine, suspending from the steam main and weighing only 300 lbs. occupies none. Heating effectiveness—Modine Unit Heaters deliver heated air throughout the working area—down to the floor. True heat distribution. Productive heat. Compare such performance with other methods, where heat is banked at the ceiling.**

**Then consider the other Modine features. Complete directional control of heated air, horizontally and vertically; individual operation of each unit — switch them on as temperature demands; ease of installation; and above all, low installation cost. And, you have an ideal industrial heating system.**

**Let us send you full information today. Write for Catalog No. 628 describing Modine Unit Heaters, including the new No. 1401.**

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A MODINE Product

FOR STEAM, VAPOR, VACUUM, HOT WATER HEATING SYSTEMS

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⅛ in. Side-Outlet Air Valve for Radiators

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¼ in. Bottom-Outlet Air Valve for Mains, Coils and Risers

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¾ in. Bottom-Outlet Quick Vent Air Valve for Mains and HV Stacks will not close against water

No. 2—Vacuum
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The outer shell of the valve is threaded into a drop forged brass base and the valves are substantially constructed of the best grade of materials.

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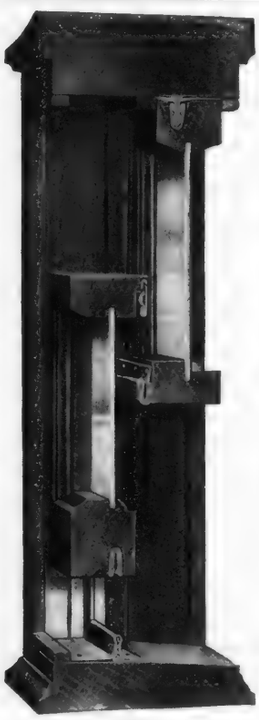
No. 6—Vacuum
⅜ in. Bottom-Outlet Quick Vent Air Valve for Mains and HV Stacks



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The insulating of walls, ceiling and floors, takes care of only a part of the heat loss if the windows are like sieves. The average window of wood or steel in a 45-mile an hour wind allows a cold air leakage as high as 174 cubic feet per hour. ATHEY cloth lined metal weatherstrips almost eliminate the leakage. The saving in fuel alone pays for the installation in less than three years.

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*Send for Athey catalog*

**Ask the owners of these prominent Hotels about Athey weatherstrip fuel economy.**

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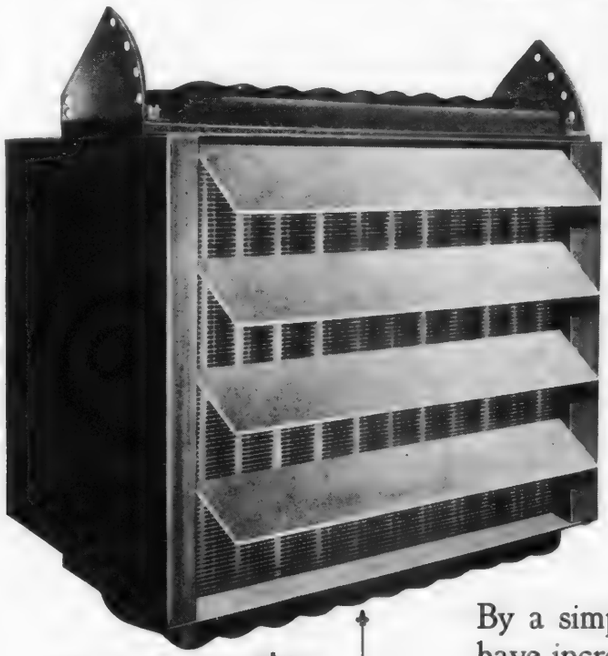

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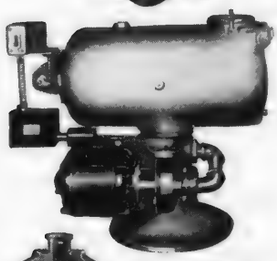
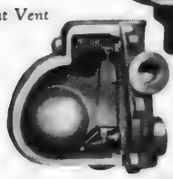


*Condensation Pump*

*Float Vent*

*Quick Vent*



*Float Drip Trap*

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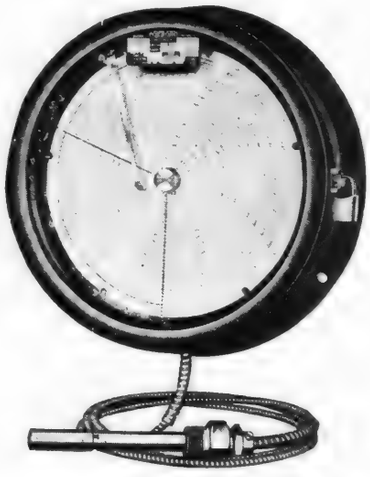
The charts made by Foxboro Recording Thermometers will furnish valuable records of past and present performance for future guidance. With the facts always before your operator it is an easy matter for him to balance generated heat and necessary heat and thereby promote heating plant efficiency.

Install Foxboro Recording Thermometers now. Your fuel bills will show immediate results. Write to the nearest Foxboro branch office.



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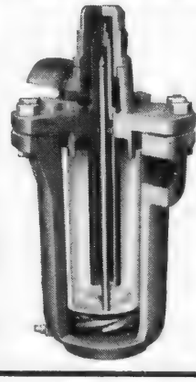

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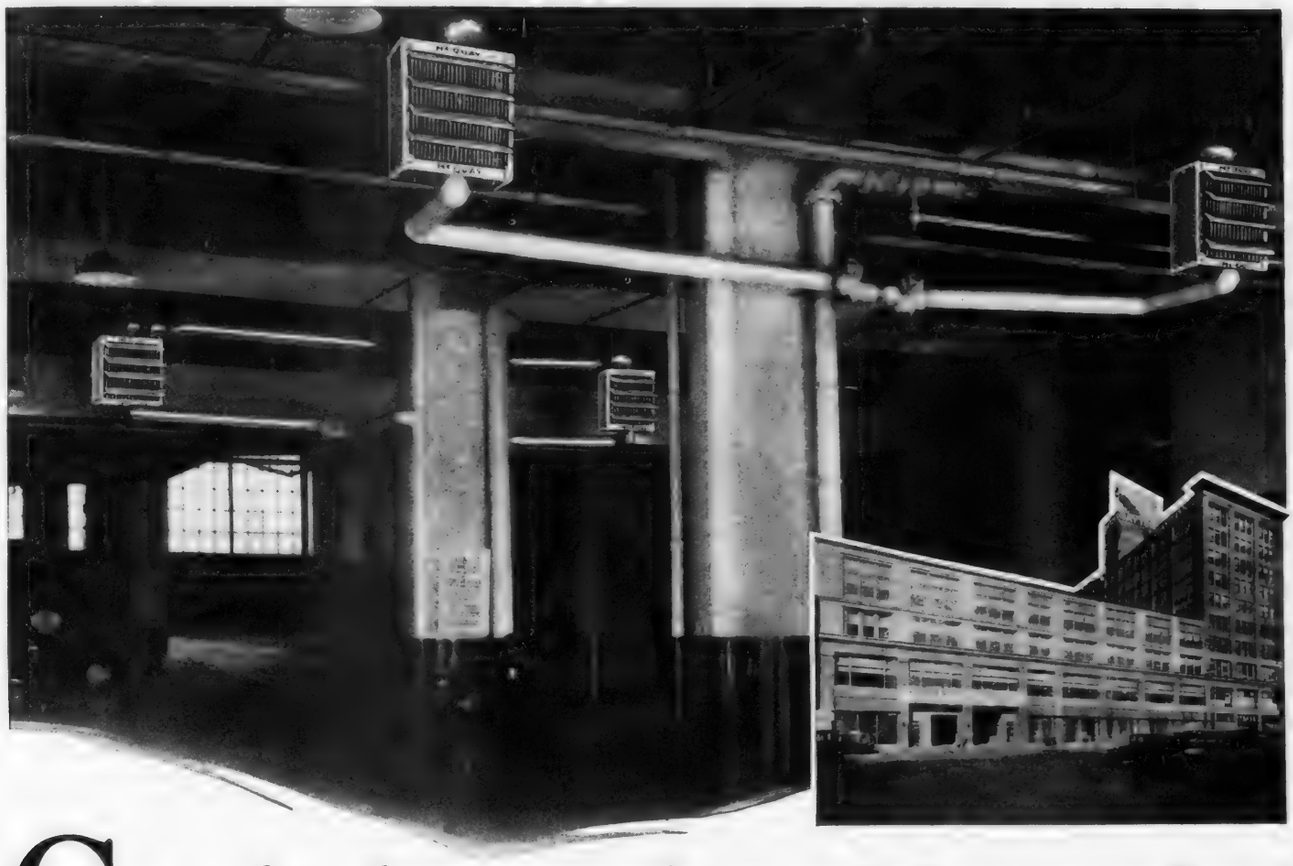

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For quicker, more efficient heating

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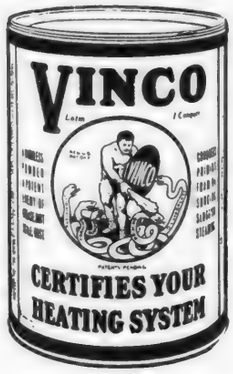


You Can See Why Vinco is acclaimed by leading engineers as the rational solution to the vexing problem of dirty heating systems; *and why the free service of the Vinco laboratories has won their whole-hearted confidence.*

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**The speed of the Adjustable Varying Speed Baldor Condenser Motor is controlled by a turn of the switch, thus providing for a variation of the number of heat units thrown off by the heater. This motor brings a new day to the unit heater industry. Motor is totally enclosed—waterproof. Once installed, needs practically no attention. Send for complete information.**

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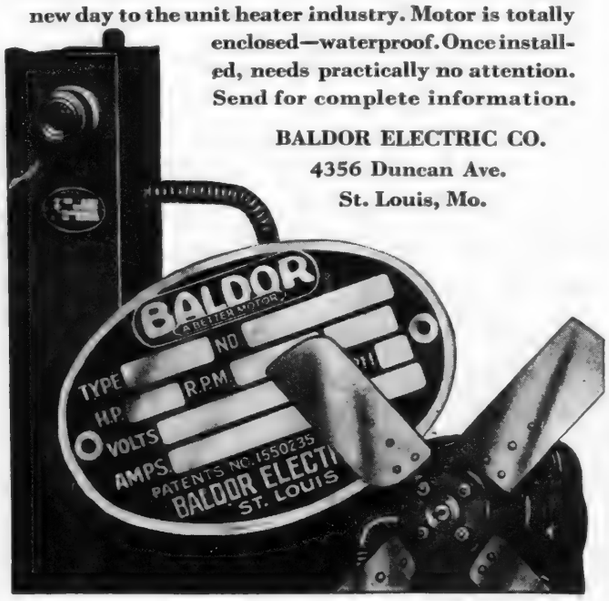


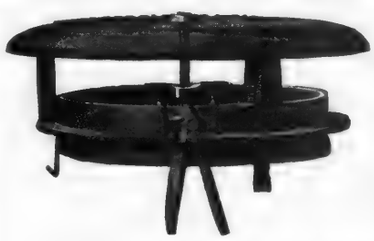

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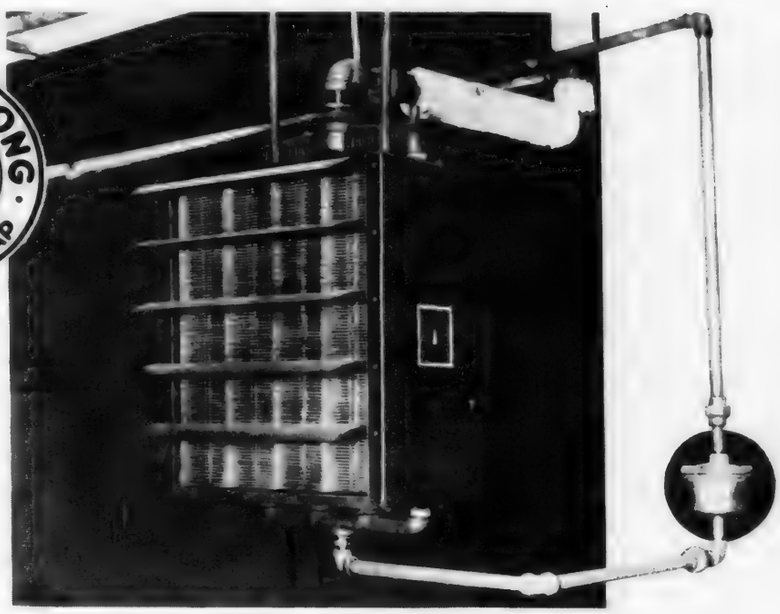
Morgan-Gerrish Co. Richardson-Boynton Co. Herman Cook Co.
American Foundry & Furnace Co., St. Paul




*Unit heater drained with an individual Armstrong Steam Trap. Note simplicity of installation.*

# Armstrong steam traps increase unit heater efficiency

EVERY engineer knows that a heating section can not work at full capacity when it is clogged with entrapped air and water. Unless steam completely fills each chamber the proper heat transfer does not take place and the resulting effect is unsatisfactory and inefficient.

At a slight cost you can insure the satisfactory performance of a heater installation by equipping each unit with an Armstrong Steam Trap. They automatically discharge air with the condensate, and live steam can not escape because the valves are water sealed. They are small in size and therefore are easily installed, requiring no special fittings or support—they are simply inserted in the drain line.

Sturdy construction of all parts and the use of chrome steel for valves and seats assure trouble-free operation over a period of years.

Send for catalog showing complete line of Armstrong Steam Traps.

## ARMSTRONG MACHINE WORKS

346 Maple Street

THREE RIVERS, MICHIGAN

DISTRICT REPRESENTATIVES IN 36 CITIES

H&V 12-Gray

# Saves 30 to 50% on

## Oil and Gas Bills

This isn't an idle boast at all .... but a fact that is backed up by users everywhere and forms the biggest reason why our dealers are having such success in merchandising BRYAN BOILERS. Potential customers are quick to grasp the meaning of such economy. Oil is firmly established as a fuel for house heating purposes and the sale of BRYAN BOILERS is only governed by the number of oil burners in use. The BRYAN is the original boiler developed for use in Oil or Gas burning and is, we believe, the only one which successfully employs all of the principles that are necessary for efficient and economical operation for these fuels.

BRYAN BOILERS

OIL GAS

# and 100% on

## Furnace Work

After the BRYAN BOILER is installed, in connection with any reliable oil-burner, it is only at rare intervals that any attention is required. Furnace tending is a forgotten task.

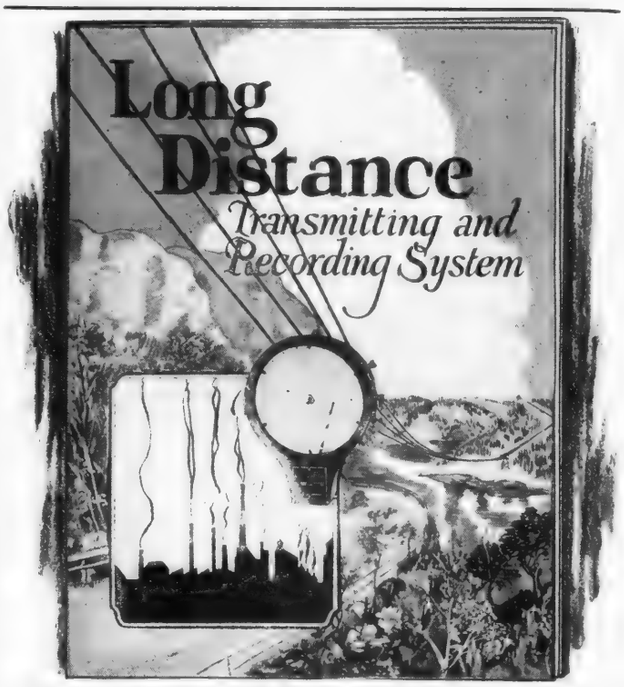
Alert merchants are coming to realize that people, in this modern era, are demanding modern merchandise and the BRYAN BOILER is distinctly modern. Bryan dealers are making money and making friends. Why not merchandise a product which is easy to sell and one that will create good-will toward your place of business due to the assurance you can give your trade of reduced fuel bills. Investigate the BRYAN Dealer-Plan NOW!

## BRYAN STEAM CORP.

BOILER DIVISION

PERU INDIANA





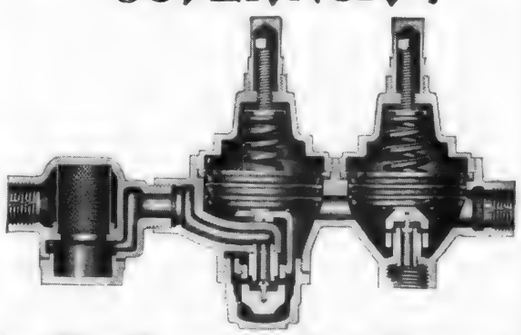

# Central Heating Plant

**Engineers should have this new BRISTOL'S Catalog, describing how records of district steam pressure and "end of line" steam pressure are transmitted direct to central boiler room where firemen can constantly check system conditions and control rate of firing in accordance with consumer demand and good service. Copy of catalog will be sent immediately to interested persons. Write.**

**The Bristol Company, Waterbury, Conn.**



# The KAINER PRESSURE GOVERNOR



## For Hot Water Heating Systems—Eliminates Tank and Fittings

Rust-proof—scale proof. Permits full flow of water without any restriction—no water hammer.

Valve body construction entirely of bronze. Removable seats. Adjustment screws concealed beneath removable bonnets.

**Guaranteed Satisfaction**

*Write us at once for our dealer proposition*

**KAINER & COMPANY**
**CHICAGO**

**761-763 Mather Street**
*Manufacturers of*
**Plumbing and Heating Specialties**

# Demand the Latest Improvements in Unit Heating and Ventilating

ADJUSTABLE MOTORS are standard equipment on PeerVent Units. Note these advantages:

1. Units can be set to deliver the exact required C.F.M. capacity.
2. The C.F.M. capacity can be changed at any time to meet changed C.F.M. requirements.
3. Units equipped with these motors are truly SILENT.
4. Adjustable motors being standard equipment, no extra cost is involved.

## ANOTHER STEP AHEAD

The PeerVent Unit can now be equipped with the PeerTherm Control as an integral part of the Unit, controlling the fresh-air damper.

These new PeerVent features again substantiate the statement made by an Architect some time ago: "I consider that PeerVent Units are at all times a little in advance with improvements."

Details and specifications on request.

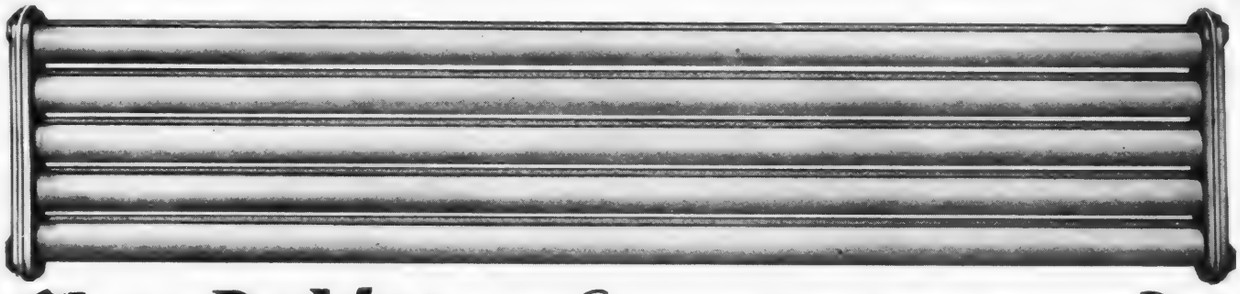
## PEERLESS UNIT VENTILATION CO., INC.

**718-34 Crescent Ave. - - - - Bridgeport, Conn.**

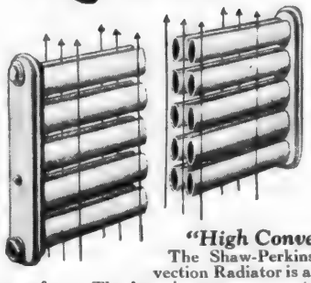
*Offices in Principal Cities From Coast to Coast*

# PEERVENT

## HEATING AND VENTILATING UNITS



# Shaw-Perkins
## HIGH CONVECTION
# Radiators



*"High Convection"*
The Shaw-Perkins High Convection Radiator is all prime heating surface. The ingenious arrangement of the oval tubes allows the air to pass freely over the tubes, unimpeded by fins, baffles, or top and bottom hub connections, consequently the radiator has a high heat emission by convection.

Send for Catalog

## Narrow One-Piece Radiators as Long as 14 Feet

**Light in Weight:** Shaw-Perkins High Convection Radiators are built in low, narrow one piece, jointless units, as long as 14 feet and weigh about one-third as much as other forms of direct radiation.

**Heat and Cool Quickly:** The light uniform walls cause them to respond promptly to the turn of the valve, giving quick and positive control over room temperatures.

**Save Space:** The radiators occupy about one-third less space than other forms of direct radiation. Brackets or legs can be supplied for either wall or floor installation.

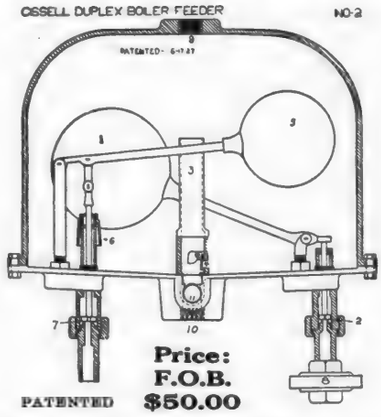
**Absolutely Sanitary:** The radiators have no rough surfaces or fins to act as dust entanglements. All surfaces are smooth and easily accessible for hand wiping.

**Unusually Adaptable:** The light weight, the distinctive design and the unique dimensions of the radiators, make them suitable for installation in heating plants, upon walls, under windows, in recesses, upon columns, pilasters, etc. They are also particularly adapted to various drying and cooling purposes and to many industrial uses.

*Get the Full Story of this Modern Radiator*
SEND FOR CATALOG "H"

**Shaw-Perkins Manufacturing Company**
**Pittsburgh, Pa.**

# Now is the Time
## For Real Boiler Protection
### While Also Increasing Its Efficiency



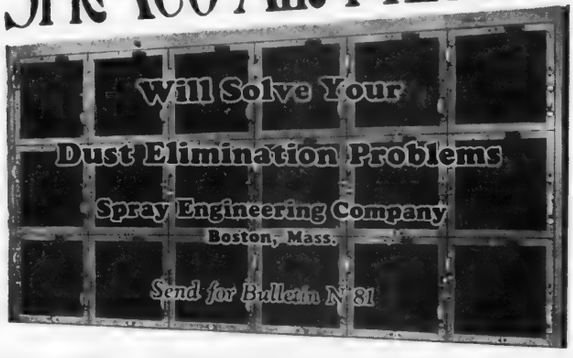

**Price: F.O.B. $50.00**
PATENTED

This Duplex feeder, built especially to meet conditions existing in heating boilers, will make your boiler absolutely automatic, eliminating danger of burning boiler or cracking sections. In selecting a boiler feeder you want the best; thousands of these feeders are in use and never a complaint. So sure are we as to its efficiency, that we sell it with an ABSOLUTE GUARANTEE.

*Write for Full Particulars and Discount*
Manufactured by

**W. M. CISSELL MFG. CO., INC.**
**111 South Second Street LOUISVILLE, KY.**

# SPRACO AIR FILTERS




# ROSS
## Crosshead-GUIDED Expansion Joint Excels in

Design, Construction and Workmanship
Over 60% of sales—Repeat Orders
Once Used—Always Demanded
Every Purchaser—A Customer

**ROSS HEATER & MFG. CO., INC., BUFFALO, N. Y.**
New York, Chicago, Philadelphia, Boston, Cleveland, St. Louis, Detroit, Pittsburgh, Baltimore, San Francisco, Seattle, Denver, Salt Lake City, Omaha, Montreal, Toronto.

Engineers of George A. Posey Tube—*Chief Engineer:* George A. Posey. *Consulting Engrs.:* W. H. Burr, Ole Singstad, Charles Derleth, Jr. *Ventilating Engineer:* Merton C. Collins.

# Ventilating
## *another great underwater tunnel*

**. . . . the George A. Posey Tube**
***linking Oakland and Alameda, Calif.***

ONLY a short time ago the Holland Vehicular Tunnels joining New York and New Jersey were opened to traffic. Now, another great tunnel has been completed—the most spacious tube of its kind in the world. This subaqueous route between Oakland and Alameda, California, accommodates more than 12,000 motor-cars daily and provides for a double line of street-cars.

To expel poisonous gas, smoke and fumes discharged by these 12,000 automobiles and to flood the tunnel at all times with pure, outdoor air, the engineers selected the same type of Sturtevant Silentvane Fans which have so strikingly demonstrated their dependability and efficiency in the Holland Tunnels. These giant fans insure unfailing and economical handling of 2,116,000 cubic feet of air per minute.

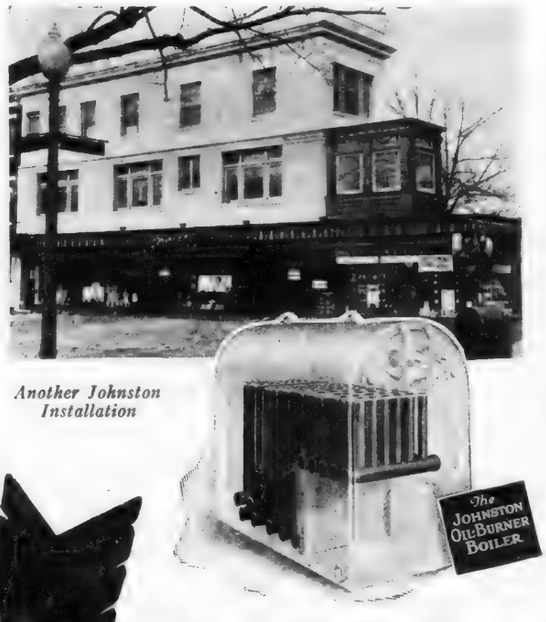
B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.
*Plants at:* Berkeley, Cal.; Camden, N. J.; Framingham, Mass.; Galt, Ontario; Hyde Park, Mass.; Sturtevant, Wisc.
*Offices in Principal Cities*

**Sturtevant**
REG. U.S. PAT. OFF.

**HEATING—VENTILATING AND POWER PLANT EQUIPMENT**

***A Tunnel Built in Dry Dock***

Twelve separate precast sections of re-enforced concrete, weighing 4,500 tons each, were built in an open air dry-dock, towed ten miles down San Francisco Bay, and lowered to a trench in the bed of the estuary. There, 42 feet below the surface, the mammoth cylinders were joined in a continuous, water-tight line.



*Another Johnston Installation*




## The Way to Greater Oil Burner Sales in 1929!

Right now you are probably working out plans to get more oil burner business in 1929. Convenience, comfort, sanitation—these have been your big selling points. And now comes another go-getter selling point — THRIFT. Add it to your oil-burner sales talk by adding the Johnston-Oil-Burner Boiler to your line. The Johnston boiler saves from 25 to 50 percent on fuel. It will help you boost sales in 1929. Get our dealer's proposition and start the New Year right.

**Johnston Brothers, Inc.**
**Ferrysburg, Michigan**

*The coupon will bring you complete information concerning Johnston Oil-Burner-Boiler and how you can line up with it for more business.*

JOHNSTON BROTHERS, INC.
Ferrysburg, Michigan.

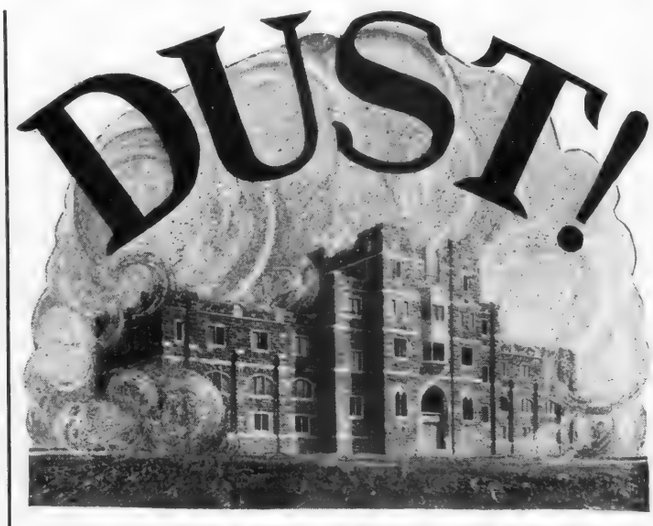
Gentlemen:

Please send me your complete proposition telling me how the Johnston-Oil-Burner-Boiler will help me increase my business.

Name .....

Address .....

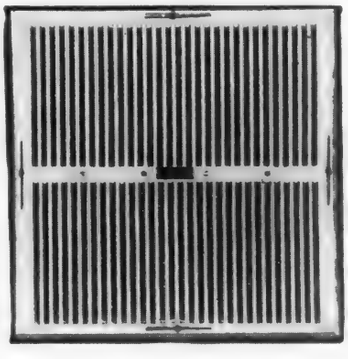
City ..... State.....




# Keep it OUT of Buildings and Save Money for the Owner

With 100,000 particles of dust and soot in a cubic inch of unfiltered air—90,000 lbs. per city block per year—is it any wonder that costly furnishings are quickly ruined and cleaning bills are high!

Most large buildings can save a few thousand dollars a year in cleaning and decorating bills by keeping the dust and soot out of air with a Protectomotor Panel Air Filter—the filter which is guaranteed to deliver air that is actually 99-9/10% clean.



Moreover, this filter prevents dangerous disease germs from getting into buildings and spreading typhoid fever, tuberculosis, influenza, etc.

The initial cost of the Protectomotor is low and the operating cost is nil. Requires no oil drains or cleaning tanks.

Operates from two to six months without cleaning. And it takes but a half minute per panel to remove all accumulations with our special vacuum cleaner.

This filter maintains the resistance below any specified static pressure drop.

You'll find our catalog very interesting. Send for a copy.

**PROTECTOMOTOR**
REG. U.S. PAT. OFF.
Perfect Positive Protection
**PANEL AIR FILTER**

STAYNEW FILTER CORPORATION
109 N. Water Street, Rochester, N. Y.

# This is Our Idea of an Efficient Indirect Heater —do you agree with us?

—*uniform pipes:* of precisely the same length and built in precisely the same way.

—*no short circuits:* flow of steam, air and water always in one direction; no opposing counter currents. Circulation being free and positive every square foot is prime heating surface.

—*expansion:* no racking by expansion and contraction each pipe being separate and independent. No rigid connections, return bends, nipples or elbows to be racked out of shape.

—*connections:* steam and drip connections very simple. No double decking with double steam and return connections required to obtain necessary heating area.

—*ample steam supply:* operates efficiently on either low or high pressure.

—*efficient regardless of position* — base horizontal, pipes vertical or pipes horizontal base vertical, or base and pipes flat.

—*all pipes wrought steel* — rust and corrosion proof.

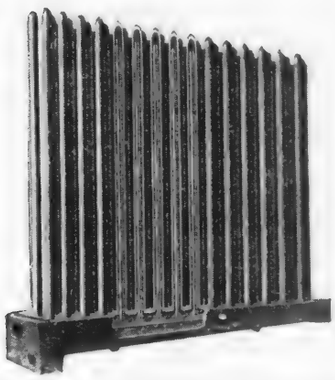
—*can be shipped knocked down* — eliminating handling and erecting of heavy, bulky units.

That briefly is the Bayley concept of an efficient indirect heater and the manner in which the Bayley Chinook Heater is built. Many installations have proven it successful. May we tell you where they are and state the argument more fully by means of our Bulletin No. 30?

**BAYLEY BLOWER COMPANY**

**742 Greenbush Avenue Milwaukee, Wisconsin**

**Bayley Chinook Heater—the most improved form of indirect Heater. Construction is such that there are no return bends, elbows or nipples. Permits use of steam at either high or low pressure.**



**Bayley**

**AIR ENGINEERING & EQUIPMENT**

HEATING AND VENTILATING
AIR WASHING AND HUMIDIFYING SYSTEMS
MILL EXHAUSTERS — PRESSURE BLOWERS
MECHANICAL DRAFT FANS
AIR AND GAS SCRUBBERS
INDUSTRIAL DRYING SYSTEMS

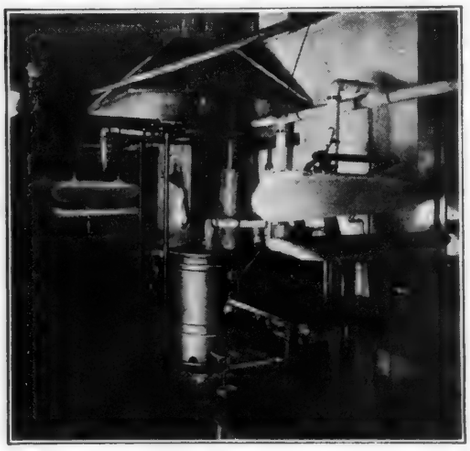
# An Ample Supply of Process Steam
## is assured with a Kane Boiler

Process steam is often one of the largest production expense items—particularly so where the main boilers must be kept at full pressure for heat or power during the winter months.

This is "peak load" period for them—but they should be shut down in the summer months. A KANE gas-fired steam boiler permits this.

The KANE boiler is indeed an economy where steam is required in isolated buildings or rooms for process work, because it needs no long heat-wasting pipe lines, is automatic in operation, and the pressure never varies under load.

There are no fuel handling costs with the KANE—and fuel is burned only when steam is needed.



*A 5 H.P. Kane Low Type Boiler installed in the Dehnlow Cleaners Plant at Chicago*

MK

**Gas Steam Boilers are widely used by Cleaners and Dyers**

***Our Bulletins will help you solve your process steam problems, and are worth writing for. Send for them.***

MEARS-KANE-OFELDT INCORPORATED

*Manufacturers of*

**GAS FIRED BOILERS AND WATER HEATERS**

**1903-1915 EAST HAGERT STREET PHILADELPHIA**

New York—9 Park Place
Boston—100 Arlington St.
Chicago—363 W. Erie St.
Buffalo—Walbridge Bldg.
St. Louis—2010 Locust Blvd.
Los Angeles—940 S. Maple Ave.
Birmingham—American Trust Bldg.

## Are You Looking for a Radiator Supply Valve That is Dependable on a Vacuum Heating System?

Particularly on those jobs where the radiator supply valve must be tight or the vacuum will cause radiators to fill with water when the supply valves are turned off. The result is water hammer when radiators are turned on.

If enough valves are turned off at one time the water of the boiler is lowered to the danger point.

We have furnished a considerable quantity of Gorton Quarter Turn Packing Lock Radiator Valves to correct these difficulties. They are recommended for new and old installations. Literature and prices gladly sent.

**Gorton Heating Corp.**

*Manufacturers*

**96 Liberty Street New York, N. Y.**

*Established 1887*

## Are You Satisfied with the controls you are recommending?

HOT WATER REGULATOR

PRESSURE REGULATOR

TEEPLE Temperature Controls combine the most advanced design with skilled workmanship. They meet every problem of heat control for gas furnaces and boilers; unit heaters; refrigerating plants; ovens; furnaces; and automatic coal and oil burners. You can recommend them wholeheartedly.

*You'll want this new Catalog . . .*

Our latest Catalog fully illustrates and describes the full line of Teeple Controls. Write for it.

**L. R. TEEPLE CO., Portland, Oregon**

# TEEPLE
TEMPERATURE
TEEPLE *Controls*

*for* GAS — STEAM — WATER — AIR

# HELICALFIN
## Extended Surface Radiation

**Sturdy Non-Corrosive**
**Highly Efficient**
**Low Air Resistance Type**

Standard and Special Heater Cores without Casings for manufacturers of Heating and Ventilating Apparatus.

Standard Heater Units complete with steel casings for fan type heating and ventilating systems, ready for installation.

Standard Copper Radiators for concealed direct radiation.

A Seamless Copper Tube Heater of great efficiency for all forced air heating systems. Many installations giving unequalled service.

Engineering data on request.

HELICALFIN Tubes are equipped with flat copper radiating fins. No corrugations to catch the dirt.

We make a size of HELICALFIN Tube for every type of heat transfer equipment.

## ROME-TURNEY RADIATOR COMPANY
**Rome, N. Y.**

***Makers of Good Radiators since 1905***

# What "Triple Service" Means!

**Year Round Domestic Hot Water**

THERE is only one Johanson, The Combination TRIPLE SERVICE Boiler. Its triple service means simply this:

1—Heat For Building
2—Year-Round Domestic Hot Water
3—Garbage Incineration

**Economy in Operation** is fully realized and assured by fullest possible Heat Utilization. You never heard of a fuel economizer being used on a Johanson TRIPLE SERVICE job.

**Domestic Hot Water the Year 'Round** eliminates the cost, waste space, fuel and maintenance expense of a hot water heater installation.

**Garbage Incineration** is a convenience and added service at no extra cost.

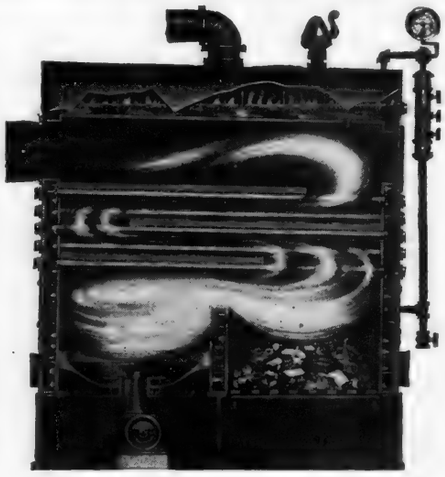
Patented Feb. 8, 1927. Beware of infringing imitations.

Recent test by Armour Institute of Technology of this boiler 1250 ft. size and steam operated at 102.4% of its rated capacity developed—

Overall Efficiency.... 81.92% Average Stack Temp. 352.4°
Average $CO_2$..... 11.6 % Steam Quality ..... 99.45%

*Write today for proposition, prices and literature*

**COMBINATION BOILER CO., Benton Harbor, Mich.**



TRIPLE SERVICE COMBINATION BOILERS

**COMBINATION TRIPLE SERVICE BOILERS**

CAPITOL

**HOT WATER**

# STA-PAK VALVES

## Never Need Re-packing

Note the detailed construction of the Capitol STA-PAK Hot Water Valve illustrated to the left. Here is a real hot water valve of the packless type, extremely pleasing in appearance. For use on pressure or expansion systems. It is a valve that will give permanent satisfaction.

Every STA-PAK valve is made of guaranteed tested materials.

**This is STA-PAK No. 24**

**Bohn Aluminum & Brass Corporation**
**CAPITOL BRASS DIVISION**
MANUFACTURERS OF BRASS VALVES, BOILER TRIMMINGS AND PLUMBERS' BRASS GOODS
**DETROIT-MICHIGAN**

# Cut Your Coal Bills

*with*

# "SHEER COMFORT"

*Automatic Electric*

# HEAT CONTROL

**Dealer's Price**

**Only $17.55**

*Write or Wire*

**H. M. SHEER CO.**
**Quincy, Illinois**
**Dept. H. V.** **Est. 1888**

# ...NEW!....

The

MIDWEST

VERTICAL

SELF-CLEANING

AIR FILTER

CONTROLLED AIR FLOW

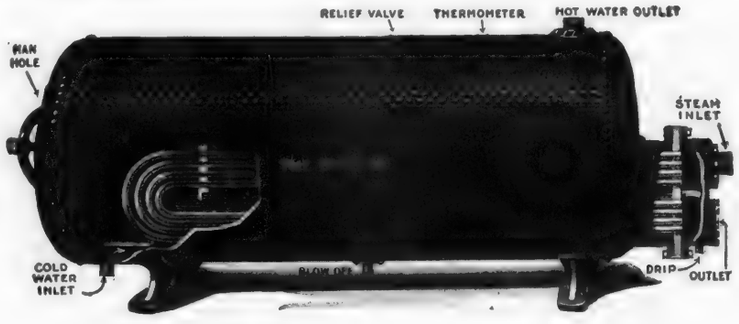
Sinuous filter medium

SEE IT AT THE POWER SHOW

MIDWEST AIR FILTERS

INCORPORATED Offices in Principal Cities

BRADFORD, PA.




*"We keep others in Hot Water"*

**SIMS**

Storage type water heaters are furnished with "U" tubes as illustrated, or with straight tubes and floating head, as may be desired or specified.

**SIMS**

Water tube heaters and Converters are also constructed with either straight or "U" tubes.

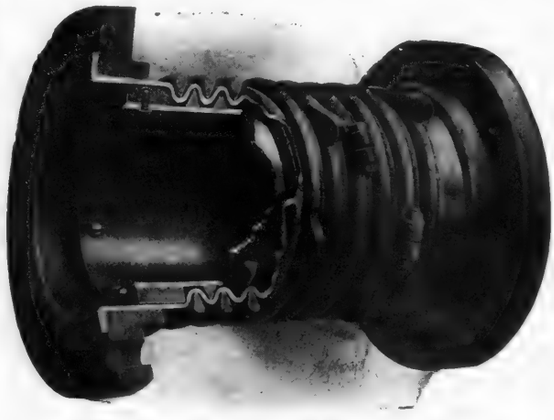
All heaters are produced complete in our plant. They are not an assembly of parts built by others.

**THE SIMS COMPANY, P. O. Box 700 Erie, Penna.**

# Wainwright Joints Will Take Up Your Pipe Line Expansion

There is no more effective method of taking up the expansion in pipe lines carrying steam, hot water or oil, than by means of the Wainwright expansion joint.

The Wainwright joint has no packing.



**Wainwright Improved Expansion Joint**

Expansion of the pipe line is absorbed by a seamless, corrugated copper tube. Rings fitted inside and outside of the corrugations distribute the pipe movement and each corrugation accepts a portion of the total expansion. An inside protecting sleeve of the Wainwright joint protects the copper expanding portion from high velocity steam and reduces the friction loss, or resistance to flow, through the joint.

***Wainwright joints are built for 150 lb. working pressure in sizes 3 to 14 in., and for 125 lb. working pressure in sizes 16 to 24 in.***

**FOSTER WHEELER CORPORATION**

**165 Broadway, New York, N. Y.**

***Branches in Principal Cities***

*Foreign Associates:—*
Foster Wheeler Limited, London, England.
Foster Wheeler Limited, Toronto-Montreal-Vancouver, Canada.

ARO UNIT COAL PULVERIZERS
AIR HEATERS CENTRIFUGAL PUMPS
CONDENSERS COOLING TOWERS
ECONOMIZERS EVAPORATORS
EXPANSION JOINTS FEED WATER HEATERS

**FOSTER WHEELER**

FRACTIONATING TOWERS HEAT EXCHANGERS
STEAM JET AIR PUMPS SUPERHEATERS
TUBE MILLS VACUUM PUMPS
WATER COOLED FURNACE SURFACE
BRASS AND COPPER TUBING AND PIPE

*A* REED *Continuous Air Filter —40,000 C. F. M. Capacity*

THE Reed Continuous Air Filter was developed originally to meet the exacting air-cleaning requirements of steel mill service—recognized as the most difficult application within the scope of modern air filters. How well the Continuous meets these requirements is evidenced by the action of a prominent steel company at Youngstown—*two months after installing their first Continuous, they have now placed orders for nine additional units.* Engineers pronounce the Continuous the most important development since the Reed Unit Filter. The coupon brings you *the reasons.* Reed Air Filter Co., *Incorporated,* 218 Central Ave., Louisville, Ky.

# Reed Air

REED AIR FILTER CO., *Incorporated* TRADE *filters* ALL METAL MARK 218 Central Avenue, Louisville, Ky.

Please send bulletin describing the Reed Continuous Filter and its revolutionary, self-cleaning principle.

*Name*..... *Company*.....

*City*..... *State*.....

# Super Section -a Boiler that will Stand Up to your recommendation

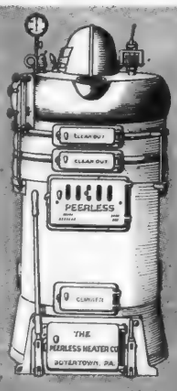
It is safe to strongly recommend PEERLESS Sectional Boilers. They make good with your customers. They make friends for your business. Wherever house heating is being discussed, you can expect a boost from your PEERLESS Boiler customers.

Only PEERLESS boilers have Super-Sections. The economy and efficiency of these boilers can be traced to other scientifically correct construction engineering of the very latest type, also, but the exclusive Super-Section water tubes furnish the basis for the greater value you can offer your Steam, Vapor or Water System customers in PEERLESS Boilers. All ratings and boilers are guaranteed.

The PEERLESS policy is as good for you as a dealer as the boiler is good for your customer.

*Write for proposition, prices and dealer literature*

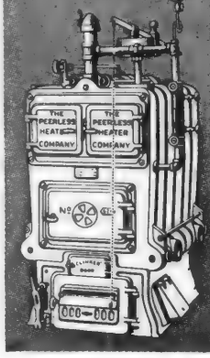
**The Peerless Heater Company**
**BOYERTOWN, PA.**




PEERLESS BOILERS

PEERLESS
Super Section
Coal Boilers

PEERLESS HEAT



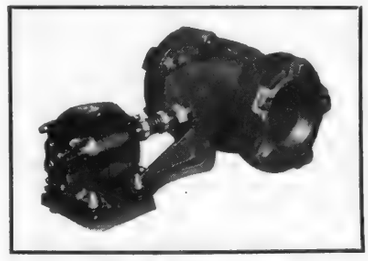

# "PEP-UP"

YOUR

HOT-WATER JOBS

WITH A

Sterlco TRADE MARK Compeller



Patent Applied For

The Compeller is a miniature motor driven pump that is installed in either the supply or return line of a hot water heating system. It will positively circulate the water regardless of temperature or pressure and will provide uniform heat in all radiators in half the time ordinarily required. No by-pass or check valve is required and the operation of the motor can be automatically controlled so as to run only when heat is required.

*Send for descriptive circular*

**STERLING ENGINEERING CO.**
**1626-44 Holton Street**
**Milwaukee, Wis.**

***Sales Representatives in all the principal cities***

MERCOID
*System of*
DIRECT CONTROL

CONTROLS

MERCOID

# T·I·M·E HAS STAMPED ITS APPROVAL

TIME is a severe task master. Only things that are made to endure can withstand its ravages. Mercoid Controls that have been in use for many years are functioning faultlessly and without any sign of deterioration. Whatever else may be said in favor of Mercoid Controls, nothing could be more commendable than the approval of time. Mercoid Controls are used over a wide range of industries and are in ever increasing demand.

***Consult Us on Your Control Problems***

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**The MERCOID CORPORATION**
564 W. ADAMS STREET, *Chicago, Illinois, U.S.A.*

25 CHURCH STREET *New York, N. Y.* — THE MONADNOCK *San Francisco, Calif.*

*Cable Address "Mercoid, Chicago"*

*Plunkett Junior High School*
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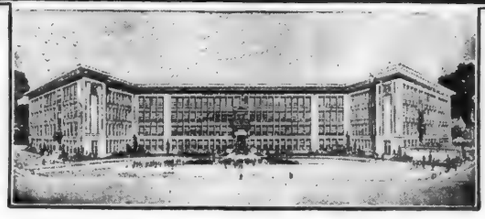
*Architect.*
*Frank Irving Cooper,*
*Associate Architect.*

*Weaver High School*
*Hartford, Conn.*
*Frank Irving Cooper, Architect.*



*North Junior High School*
*Quincy, Mass.*
*Frank Irving Cooper, Architect, Boston.*

# Hot Water in High Schools

More and more attention is being paid to providing an adequate hot water supply in the modern high school building . . . showers, swimming pools, and general service demands. It will be noted that the same architect, one who specializes in school buildings, has confidence in Whitlock Type K Heaters . . . installed in all of the four buildings illustrated. On any type of building, a Whitlock Hot Water Engineer can and will gladly help you plan for the hot water supply.

WHITLOCK SERVICE WATER HEATERS

**THE WHITLOCK COIL PIPE COMPANY**
**40 South Street, Hartford, Conn.**

New York, Boston, Philadelphia, Chicago, Baltimore, Detroit, Los Angeles, San Francisco, and other principal cities. Consult telephone book.

*Service* The *Satisfaction*

# VECO SYSTEM of VAPOR HEATING

An "Open to atmosphere" system.
The original and standard method of
Vapor Heating

# VAPOR ENGINEERING COMPANY

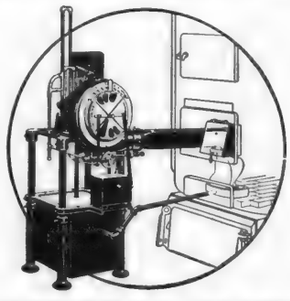
PHILADELPHIA—10 So. 18th Street
J. Wilbur Glassey—M. S. Buck

NEW YORK—489 Fifth Avenue
Chas. E. Scott—R. C. Willis

**Continuous Flame**

*No Gas Pilot*
*No Electric Ignition*

**Distributors**
**Write for the 1928-29 Sales Plan**

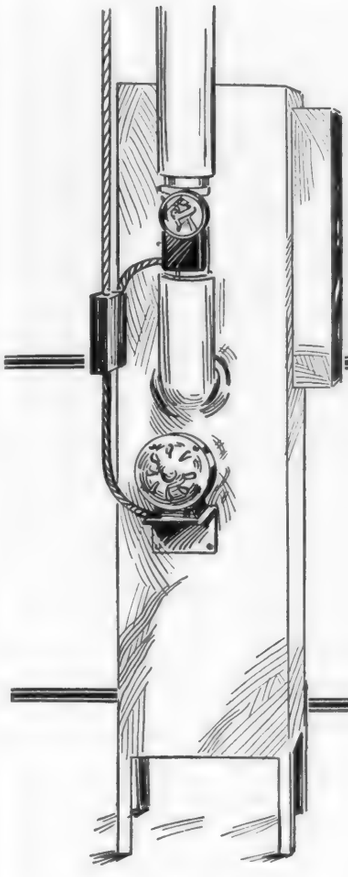


McILVAINE OIL BURNER
Listed by Underwriters

**Dependable Heat**

*Graduated Automatic Control*
*Mechanical Draft*

**McILVAINE BURNER CORPORATION**
**Dept. H 745 Custer Ave.**
**EVANSTON, ILLINOIS**



# Making Unit Heaters Easier to Sell

26AR

64

56R

*At the*
**POWER SHOW**

*Con-Tac-Tor Controls for Unit Heaters, as well as for Oil Burners, Booster Fans, Refrigeration Units, and other devices, will be exhibited at the Power Show, Dec. 3 to 8. Factory engineers will be on hand to answer your questions.*

***BOOTHS 306-307***

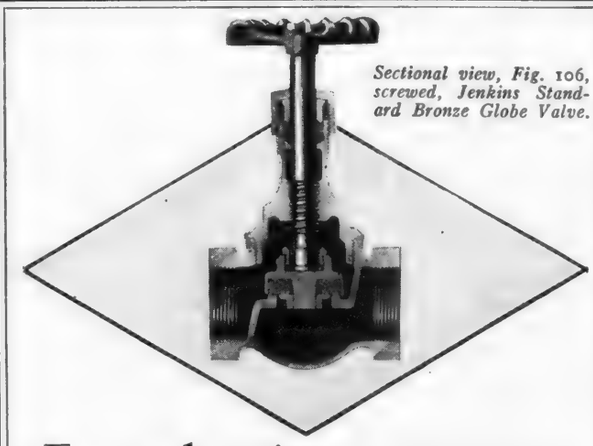
MOST of the many excellent arguments advanced by sellers of unit heaters involve the application of automatic control. Without such control the talked-of efficiency falls far short of the possible maximum. Manual control cannot result in even heat because it is human to forget, and no two people will agree as to the exact temperature, anyway.

A highly sensitive, thoroughly reliable CON-TAC-TOR control will turn the heater on and off as temperature demands, and a second control may be applied to prevent operation of the motor if, for any reason, there is not sufficient heat in the coil to warm the ejected air. Instruments and installation are simplicity itself, and the cost is negligible in comparison to the actual dollars-and-cents saving which results.

This assurance of true heating efficiency makes it easier to sell your unit heater, because the prospect can readily grasp these advantages. There's profit in selling the controls, too. Let us send you a copy of Bulletin 141H with full details.

CON-TAC-TOR

**ABSOLUTE CON-TAC-TOR CORPORATION ELKHART, INDIANA**



*Sectional view, Fig. 106, screwed, Jenkins Standard Bronze Globe Valve.*

## Every heating contractor is a purchasing agent

*Fig. 370*
*Screwed, Jenkins Standard Bronze Gate Valve*

*Fig. 352*
*Screwed, Jenkins Standard Bronze Swing Check Valve*

*Fig. 168*
*Jenkins Bronze Radiator Angle Valve with male union*

Every heating contractor is a purchasing agent for his customers. Whether he realizes this or not, his customers are sure to do so, and many look upon him as an equipment counselor to be held to strict account for what he installs.

When it comes to valves it pays to do your work full justice by using Jenkins. An all-Jenkins job is a trouble-proof job—one that is bound to create a lasting favorable opinion of your work.

To many of your customers, the name and trade mark of Jenkins Bros. are sure to be already known—symbols of a valve made for the maximum service, not merely the average. To these people, the use of such quality-first equipment does much to create a common bond of confidence, like an introduction from a mutual friend.

Let Jenkins performance and the Jenkins 60-year reputation combine to win for your work that all-important consideration — favorable word-of-mouth publicity.

JENKINS BROS.

80 *White Street.....New York, N. Y.*
524 *Atlantic Ave.....Boston, Mass.*
133 *No. Seventh St...Philadelphia, Pa.*
646 *Washington Blvd....Chicago, Ill.*
*JENKINS BROS., Limited*
*Montreal, Canada London, England*

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

# Yale University Installs Another National—

## *equips Bingham Hall with Cast Iron instantaneous Coil Type Heater*

One hundred and twenty students using 47 lavatories and 37 showers in this new dormitory require plenty of hot water. National Heaters abundantly supply their needs. They heat 1,800 gallons per hour from 40° to 180° with 10-lb. steam pressure.

There are many National heaters in Yale University buildings, none of which we have ever had to replace. Our standards of excellence practiced over a period of 45 years of manufacturing cast iron instantaneous coil type heaters account for their installation in this famous University and many other buildings in all parts of the country.

National heaters are so well constructed that there is practically no servicing required. The tubes and packing stay tight. Thus we frequently hear of National Heaters giving thirty years' continuous service without cleaning.

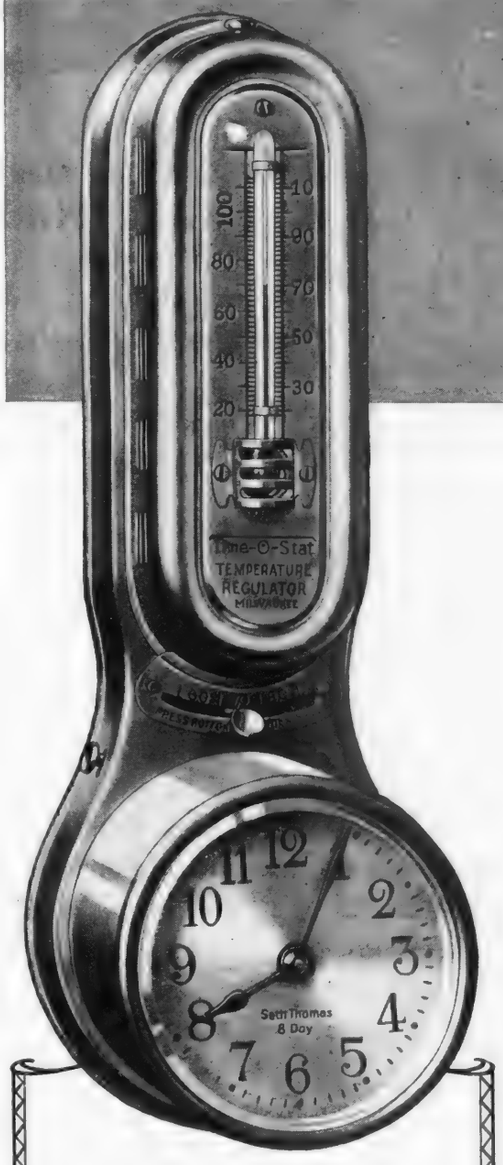
***Let National quote on specifications for your next Coil Type Feed Water Heater.***

THE NATIONAL PIPE BENDING CO.
**160 River Street** *Established 1883* **New Haven, Conn.**
BOSTON NEW YORK PHILADELPHIA

# NATIONAL
**Coil Type**
**Freed Water Heaters**

# Time-O-Stat

## *Easy to Operate— Sell— Service*




THE Time-O-Stat Temperature Regulator requires an absolute minimum of adjustments. Its simplicity and trouble free operation can be clearly shown by an easy demonstration. Because it is constructed to operate unfailingly with minimum service or attention over a long period of time, it has been judged a sensation in the automatic temperature control field.

These outstanding features find a ready demand for the Time-O-Stat among those who use coal, gas or oil heat. The Time-O-Stat provides a Seth Thomas 8-Day Clock and a Tycos Thermometer. The new snap action contact blade feature, assures unusually accurate temperature control. The Electric Control Motor, power unit by General Electric, makes possible absolutely silent operation.

### *Unconditionally Guaranteed*

To protect its dealers and users as well, the Time-O-Stat is unconditionally guaranteed to be free from defects in workmanship and materials.

Time-O-Stat Temperature Regulators are handled and serviced exclusively by authorized dealers. Apointments are now being made among leaders in the field.

*ADAPTABLE FOR COAL, GAS OR OIL*

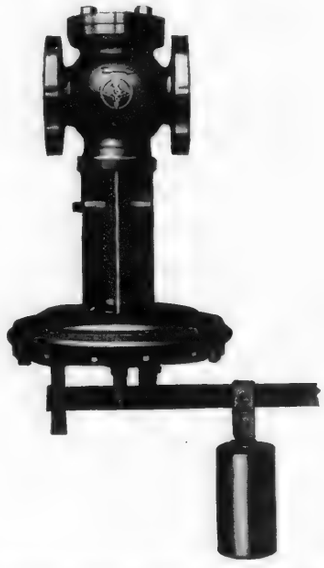
### *Note These Time-O-Stat Features*

1. Attractive chromium plate or statuary bronze finish.
2. Seth Thomas 8-Day Clock.
3. Tycos Thermometer.
4. Power unit by General Electric.
5. Contact blade, snap action.

# Time-O-Stat

## *Temperature Regulators*

TIME-O-STAT CORPORATION, *Milwaukee, Wis.*



Mason Lever Style Reducing Valve

CURTIS PUBLISHING CO. .....*Philadelphia*
GENERAL MOTORS BUILDING ....*New York*
GRAYBAR BUILDING .....*New York*
ROSSLYN HOTEL .....*Los Angeles*
GOODYEAR TIRE & RUBBER CO. .....*Akron*
MALLORY HAT CO. .....*Danbury*

In these and many other well known plants and buildings, Mason Regulators form an important part of the pressure control equipment used in connection with the heating systems.

Easy to install, moderate in price, no servicing required afterwards... these are the reasons why experienced contractors know it is to their advantage and profit to include them in the specifications they handle. Write for your copy of Catalog No. 62.

*See our exhibit at Booths 221 - 222 at the New York Power Show*

Mason Regulators

MASON REGULATOR CO.
BOSTON, MASS.

San Francisco Office, 606 Howard Street

2384

Perfect Control

MASTER Heat REGULATORS
provide
**Gradual Operation of Dampers or Valves**

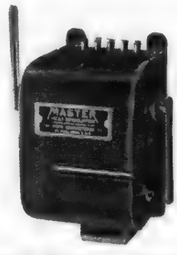
Thermostat indicates various positions of dampers or valves.

(Thermostats furnished in clock or plain models.)

Master Heat Regulators are precision instruments, the result of 12 years of experience in designing and building heat regulation equipment. Their exclusive graduated operation provides a new, decided improvement in heating efficiency and uniformity that is eagerly welcomed by all users.

Operates equally well with coal, gas or oil in steam, hot water, warm air, vapor or combination systems.

*Write for complete information*



Full Electric Motor

WHITE MANUFACTURING CO.
2362 University Avenue ST. PAUL, MINNESOTA

MASTER HEAT REGULATOR

THERMO SYPHON TRAP

LYTTON MANUFACTURING CORPORATION

*High Grade Return, Vacuum, Lifting and Separating Steam Traps, Reducing Valves, Blow-off Valves*

FRANKLIN, VIRGINIA

# Cracked Boilers

Cracked boilers are rarely found in steam heating installations where THERMO SYPHON TRAPS are used. They insure heating efficiency. It is especially designed to handle the condensation from any type of one-pipe or two-pipe steam heating systems, with a vacuum or pressure not exceeding 20 pounds pressure on boiler.

The THERMO SYPHON TRAP returns all condensation to the boiler, maintaining the water line regardless of pressure or vacuum. It improves circulation and insures noiseless operation. Prevents air-bound or water-logged conditions. A safeguard for all types of vapor or atmospheric systems.

***Send for Bulletin No. 16-HV which will give you full details. Write for it today.***

For Efficiency Always Use
Thermo Syphon Traps

**The ability of the Haines Trap to function year after year without the need of attention or repair is its best advertisement.**

*Haines Traps installed on every radiator and drip point*

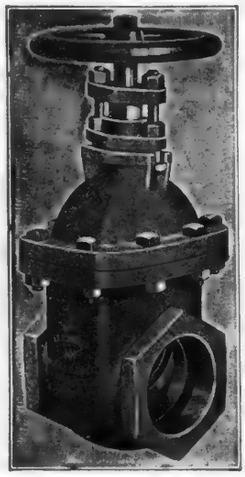
*Is assurance of an economical and trouble-free system*

**Not a particle of steam gets away.**
**Nothing that ought to stay in gets out.**
**Nothing that ought to get out stays in.**

WILLIAM S. HAINES & CO.

12th & Buttonwood Sts.
PHILADELPHIA, PA.

# IRON BODY GATE VALVES



SCREWED, FLANGED
AND
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NON-RISING STEM
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O. S. and Y. PATTERNS

ALSO MANUFACTURERS OF
Cast and Malleable Iron Fittings

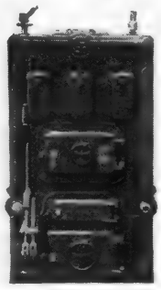
## Illinois Malleable Iron Company

1801 Diversey Parkway Chicago, Ill.

J Winning Cards In Every Pack

## Burnham Boilers

for Every Heating Purpose



*Your Jack of Diamonds Is*
The High Pressure BURNHAM For Hot Water Supply

BECAUSE—It's your right bower when you have a big-quantity hot water supply job to play for. When there's a big prize to play for, like a fifty family hot water supply, this High Pressure Burnham will turn the trick, and sweep the winnings into your lap.

*Take your tip from latest Catalog. A postal will bring your copy.*

Burnham Boiler Corporation
IRVINGTON, NEW YORK
*Representatives in all principal cities of United States and Canada*

Do you know

that every Heating and Ventilating Engineer is entitled to a copy of this Atlas Junior Catalog No. 21? Check off those items below in which you are interested, mail to us, and you will receive this catalog, prices, and whatever you may need in the way of information on any Atlas product.

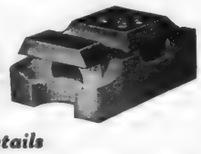
☐Reducing Valves ☐Float Valves
☐Temperature Regulators ☐Swing Joint Fittings
☐Bronze Unions
☐Damper Regulators ☐Thermostats
☐Pump Governors ☐Balanced Valves

ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE
281 South Street, Newark, N. J.

## Do You Still Use Large Domestic Coal?

Why not economize by using Buckwheat Coal—at about half the price of domestic coal?

*You can burn Buckwheat with PYRAMID GRATES*



*Let Us Send Full Details*

**PYRAMID IRON PRODUCTS CO.**
230 East 41st Street New York City

*The*

# Park Central Hotel Also Chose

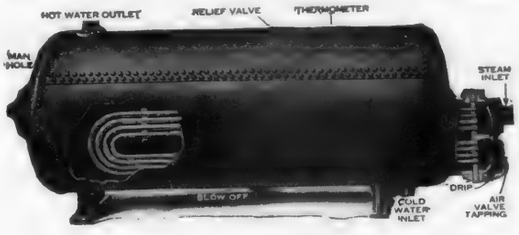
# *Patterson*
## Hot Water Heaters

Another monument to the good judgment and ability of Gronenberg & Leuchtag, Architects, and John Weil Plumbing Co., is the new Park Central Hotel, New York. It is a high compliment to Patterson Hot Water Heaters that they were chosen to supply hot water for the swimming pool, kitchens and 1100 baths in this modern hotel.

In selecting Patterson Hot Water Heaters these men followed the example of most of the country's architects and engineers who handle large, important projects. For you'll find the Patterson in a big percentage of the important buildings.

If you want dependable hot water service, play safe and specify the "Patterson"—the hot water heater backed by an iron-bound guarantee to deliver all the hot water required, as hot as required and as quickly as required.

Let us send you a list of installations and catalogs.




**The Patterson-Kelley Co.**
**107 East 40th St., New York, N.Y.**

# Gradual, Thermostatic Draft Control
## for
## Hot Water Boilers

Gradual draft control is as practical on hot water boilers as on steam, vapor and vacuum systems, provided the regulator is sensitive enough and powerful enough to transmit slight changes of water temperature into action on the draft and check dampers.

The National METAPHRAM Type "F" Damper Regulator does this—without the aid of room thermostats, electrical connections, motors, or other mechanical complications. It is a simple, self-contained thermostatic device, easily and quickly installed in the boiler shell or flow line, working directly from changes in water temperature.

It is a sensible, practical application of thermostatic control working directly on the heat source.

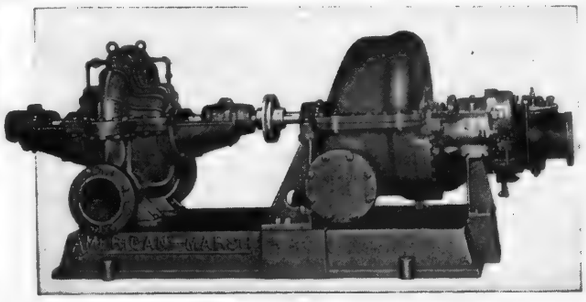
Sign the coupon, or write us today, for all the details.

**NATIONAL REGULATOR CO.**
**2309 Knox Avenue Chicago, Ill.**

*National Systems of Heat Regulation and Humidity Control. METAPHRAM Damper Regulators for domestic heating boilers, A-JACKS High Pressure Steam Damper Regulators and Industrial Thermostatic Devices.*

NATIONAL REGULATOR CO., 2309 Knox Ave., Chicago.
Send us complete information on METAPHRAM Type "F" Damper Regulator.

Name .....
Address .....
Town ..... State .....
My jobber is .....



Use HBM Centrifugal Pumps for boiler feed, water supply, pressure boosting, circulating, air washer service, process work, fire service, etc. Built ¾-inch to 16-inch; capacities to 11,000 g.p.m.; heads up to 275 ft.; motor, steam turbine, or belt drive.

# New-

## yet the Same Proven Quality as of Old

WITH over 25,000 in service, engineers and contractors need no introduction to American - Marsh Single Stage Centrifugal Pumps.

But now these pumps take another long step ahead. Further research, further experimentation covering more than two years, has added extra high operating efficiencies.

Now we call them the *new* HBM Pumps—new because of their new ability, by virtue of higher efficiencies, to save money—cut operating costs to the bone.

Otherwise, however, they are the same as before—same sound, heavy construction—same refinements of design. Prices no higher, even in some cases reduced.

Thus, the *new* HBM Pumps are today's outstanding good pump "buy." We can show you very interesting economies. Write for new Bulletin 38.

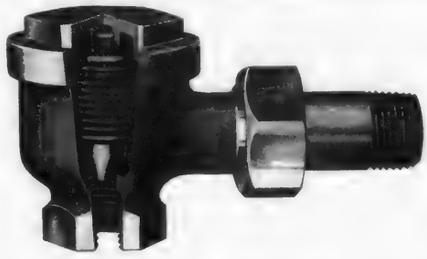
AMERICAN STEAM PUMP COMPANY
BATTLE CREEK, MICHIGAN

**AMERICAN-MARSH**

**New HBM Centrifugal Pumps**

## THE No. 12 THERMOFLEX RADIATOR TRAP

**with the PROOF-TESTED BELLOWS**



Remember this when specifying and buying thermostatic traps!!! That while Thermoflex Traps are sold for low pressure vapor and vacuum heating systems, occasionally or accidentally subjecting them to steam pressures up to 100 lbs. *will not injure the bellows.* The hydraulic forming process which proof-tests the bellows to several hundred pounds internal pressure, eliminates any possibility of a defective bellows being assembled into a trap.

***Let us tell you about Thermoflex Specialties***

**W. D. CASHIN COMPANY**

**35 HARTFORD STREET BOSTON, MASS.**

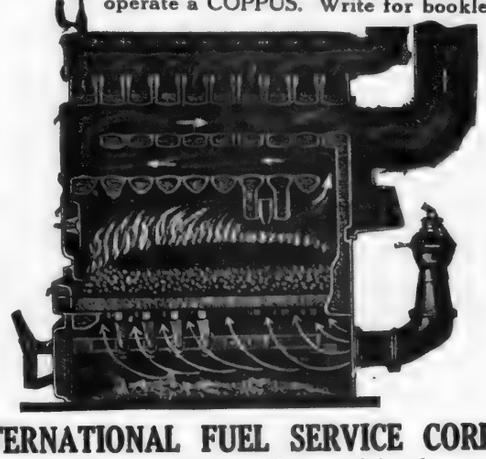
*Distributors in*
New York, Chicago, Philadelphia, Syracuse, Cleveland, Detroit, Charlotte, Washington, Hartford, Conn., San Francisco, Minneapolis, Pittsburgh, St. Louis

## COAL BILLS CUT ONE-HALF

WITH THE COPPUS (REGISTERED U.S. PAT. OFFICE)

### UNDER-GRATE DRAFT BLOWER

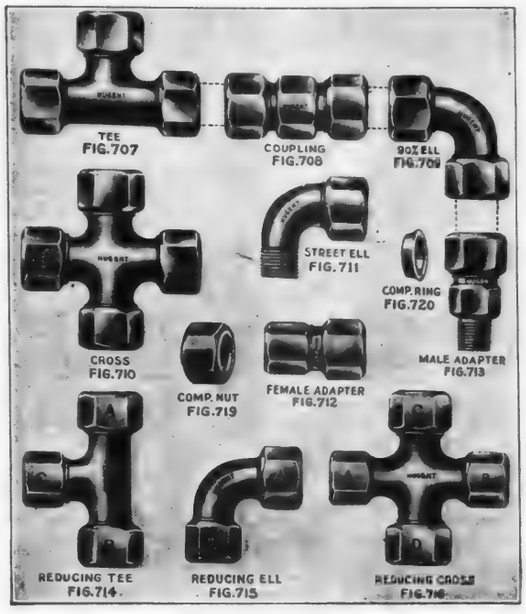
For all classes of heating plants in Homes, Schools, Churches, Office and Public Buildings, Apartments, etc. Burns Buckwheat Coal in any boiler or heater with no changes in grates, scientifically constructed. Burns any grade of coal. Anyone can operate a COPPUS. Write for booklet.

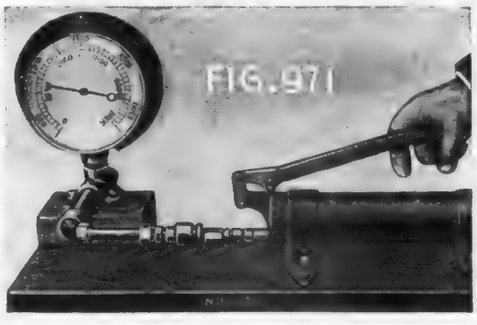


**INTERNATIONAL FUEL SERVICE CORP.**
Sole Distributors in United States and Canada.
**BRIDGEPORT, CONN.**

# Nugent Compression Union Pipe Fittings and Valves for Any Purpose

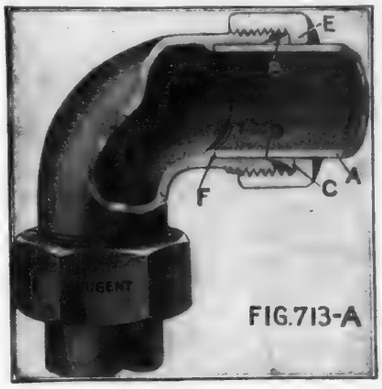
**Working Pressure up to 2000 lbs. Also Steel Tubing**



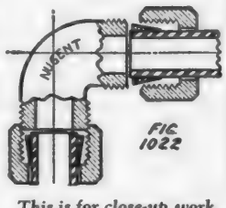




**Practical Demonstration**

Note the 4500 lbs. pressure on the gauge —not a sign of a leak or slippage.




100% Tighter Joint and 75% quicker to install than a threaded pipe fitting.




*This is for close-up work where it is impossible to enter the pipe into the fitting as in 713-A.*

# Nugent Crank Case Fuel Oil Filter

**HEAT YOUR BUILDING WITHOUT COST**

**BY BURNING DISCARDED CRANK CASE OIL**

**NO MORE BURNER TROUBLE**

***Read this Letter***

MONARCH GARAGE

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CHICAGO, ILL.

Wm. W. Nugent & Co. December 19,1927.
Chicago,Ill.

Gentlemen:-

About a year and a half ago we purchased from you a Nugent Oil Filter and motor driven oil pump to filter automobile crank case oil for our oil burner.

This purchase has been one of the best investments we ever made, because the apparatus paid for itself in less than three months. We operate our burner on the filtered crank case oil entirely, consequently we have no fuel bills.

The filter removes the water, dirt, grit, and carbon from the oil so efficiently that the fine mesh strainer at the burner never has to be cleaned, and the burner operates perfectly.

Cleaning the filter requires only ten minutes twice a week and there is no other upkeep to the filter, as the filtering elements will last for years without renewing.

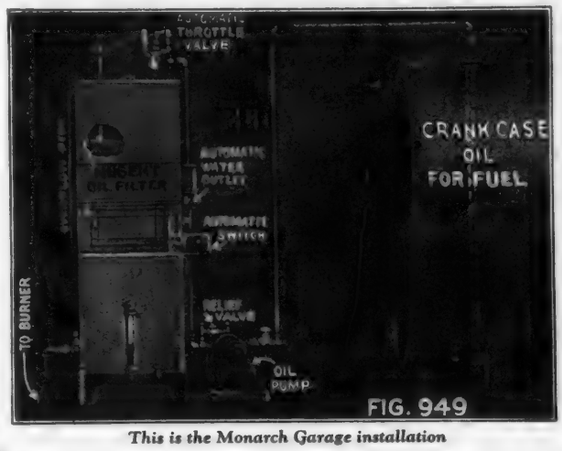
We are very pleased with the filter and pump as well as the service you have given us. We highly recommend your apparatus to anyone.

Very truly yours,

MONARCH GARAGE
By E. Lee Kelly

Full Automatic

Any Capacity




*This is the Monarch Garage installation*

*Write for catalog*

## WM. W. NUGENT & COMPANY

**409 N. Hermitage Ave., Chicago, U. S. A.**

**Builders since 1897 of**

**Oiling Systems** **Oiling Devices**
**Oil Filters** **Oil Pumps**

# ENGINEERS' SPECIFICATION INDEX

### ACID FUME EXHAUSTERS
Duriron Company, Inc., The, Dayton, O.

### AIR COMPRESSORS
American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Nash Engineering Co., So. Norwalk, Conn.
Powers Regulator Co., Chicago, Ill.

### AIR CONDITIONING APPARATUS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Grinnell Co., Providence, R. I.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Phila., Pa.

### AIR COOLING & DRYING SYSTEMS
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

### AIR ELIMINATORS
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corporation, New York.
Hoffman Specialty Co., New York.
Marsh & Co., Jas. P., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

### AIR FILTERS
American Blower Co., Detroit, Mich.
Connor Co., Inc., The W. B., New York.
DeBothezat Impeller Co., Inc., New York
General Air Filters Corp., New York.
Midwest Air Filters, Inc., Bradford, Pa.
National Air Filter Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.
Staynew Filter Corp., Rochester, N. Y.

### AIR SEPARATORS
Bishop & Babcock Sales Co., Cleveland, Ohio.
Western Engineering Co., San Francisco, Calif.

### AIR WASHERS
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
New York Blower Co., Chicago, Ill.
Spray Engineering Co., Boston, Mass.

### BELTING
Alexander Bros., Inc., Philadelphia, Pa.

### BLOWERS, FAN
(See Fans, Supply & Exhaust).

### BLOWERS, PRESSURE
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

### BLOWERS, ROTARY
Wing Mfg. Co., L. J., New York.

### BLOWERS, TURBINE
Buffalo Forge Co., Buffalo, N. Y.
Wing Mfg. Co., L. J., New York.

### BOILER CEMENT
Banner Rock Products Co., Alexandria, Ind.
Johns-Manville Corp., New York.

### BOILER COMPOUNDS
Vinco Co., Inc., New York.

### BOILERS, DOWN-DRAFT
American Radiator Co., Buffalo, N. Y.
Brownell Co., The, Dayton, Ohio.
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
National Radiator Corp., Johnstown, Pa.
Pacific Steel Boilers Corp., Waukegan, Ill.
Page Boiler Co., Wm. H., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

### BOILERS, GAS-FIRED
American Gas Products Corp., New York.
American Radiator Co., Buffalo, N. Y.
Eclipse Fuel Engineering Co., Rockford, Ill.
Frost Mfg. Co., Galesburg, Ill.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
National Radiator Corp., Johnstown, Pa.
Stanwood Corporation, Cincinnati, Ohio.

### BOILERS, HEATING
American Radiator Co., Buffalo, N. Y.
Brownell Co., The, Dayton, Ohio.
Bryan Steam Corp., Peru, Ind.
Burnham Boiler Corp., Irvington, N. Y.
Coatesville Boiler Works, Coatesville, Pa.
Combination Boiler Co., Benton Harbor, Mich.
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Gorton Heating Corporation, New York.
Heggie-Simplex Boiler Co., Joliet, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Johnston Brothers, Inc., Ferrysburg, Mich.
Kewanee Boiler Corp., Kewanee, Ill.
Monitor Boiler Co., Philadelphia, Pa.
National Radiator Corp., Johnstown, Pa.
Pacific Steel Boilers Corp., Waukegan, Ill.
Page Boiler Co., Wm. H., New York.
Peerless Heater Co., Boyertown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Spencer Heater Co., Williamsport, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.
Weil-McLain Co., Chicago, Ill.

### BOILERS, MAGAZINE FEED
Gorton Heating Corporation, New York.
Spencer Heater Co., Williamsport, Pa.

### BOILERS, OIL-FIRED
Bryan Steam Corp., Peru, Ind.
Combination Boiler Co., Benton Harbor, Mich.
Johnston Brothers, Inc., Ferrysburg, Mich.

### BOILERS, POWER
Eclipse Fuel Engineering Co., Rockford, Ill.
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Heggie-Simplex Boiler Co., Joliet, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

### CALORIMETERS
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.

### CIRCULATORS, WATER
Janette Mfg. Co., Chicago, Ill.

### COILS, PIPE
Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clow & Sons, James B., Chicago, Ill.
Foster Wheeler Corporation, New York.
Heat Transfer Products, Inc., New York
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York
Whitlock Coil Pipe Co., Hartford, Conn.

### CONDENSERS
Davis Engineering Corp., New York.
Foster Wheeler Corporation, New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Heat Transfer Products, Inc., New York
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

### CONVERTERS, HOT WATER
Davis Engineering Corp., New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

### COOLERS, AIR
Alberger Heater Co., Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.

### COOLERS, OIL
Davis Engineering Corp., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Whitlock Coil Pipe Co., Hartford, Conn.

### COOLING TOWERS & PONDS
Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
Foster Wheeler Corporation, New York.
General Air Filters Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.

### COPPER BOILERS
Badger & Sons Co., E. B., Boston, Mass.

### COPPER KETTLES
Badger & Sons Co., E. B., Boston, Mass.

### COVERING, BOILER, PIPE, ETC.
American District Steam Co., North Tonawanda, N. Y.
Banner Rock Products Co., Alexandria, Ind.
Johns-Manville Corp., New York.
Ric-wiL Co., The, Cleveland, Ohio.
Wyckoff & Son Co., A., Elmira, N. Y.

### DAMPERS, DUCT
Buckeye Blower Co., The, Columbus, Ohio.
Clarage Fan Co., Kalamazoo, Mich.

### DAMPER LOCKS, SELF-LOCKING
Northern Weatherstrip Co., Duluth, Minn.

### DEHUMIDIFYING APPARATUS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

### DISTILLERS, (WATER)
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

### DRAFT APPLIANCES
Draft-A-Justor Corp., Chicago, Ill.
International Fuel Service Corp., Bridgeport, Conn.

### DRYING SYSTEMS
(See Air Cooling & Drying Systems).

### DUST COLLECTING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Midwest Air Filters, Inc., Bradford, Pa.
Reed Air Filter Co., Inc., Louisville, Ky.
Skinner Bros. Mfg. Co., St. Louis, Mo.

### DUST COLLECTORS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Phila., Pa.

### ENGINES, STEAM, AUTOMATIC
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, Ohio.
Clarage Fan Co., Kalamazoo, Mich.
Frost Mfg. Co., Galesburg, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

### ENGINES, STEAM, HIGH SPEED
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, Ohio.
Clarage Fan Co., Kalamazoo, Mich.
Frost Mfg. Co., Galesburg, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.

### EQUALIZING LOOPS
Hoffman Specialty Co., New York.
Sarco Co., Inc., New York.

### EVAPORATORS, BOILER FEED MAKE-UP
Buffalo Forge Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Foster Wheeler Corporation, New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

### EXHAUST HEADS
Aeolus Dickinson, Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

### EXHAUST SYSTEMS
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

### EXHAUST SYSTEMS, ACID
Duriron Company, Inc., The, Dayton, O.

### EXPANSION JOINTS
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Foster Wheeler Corporation, New York.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Walworth Co., New York
Webster & Co., Warren, Camden, N. J.

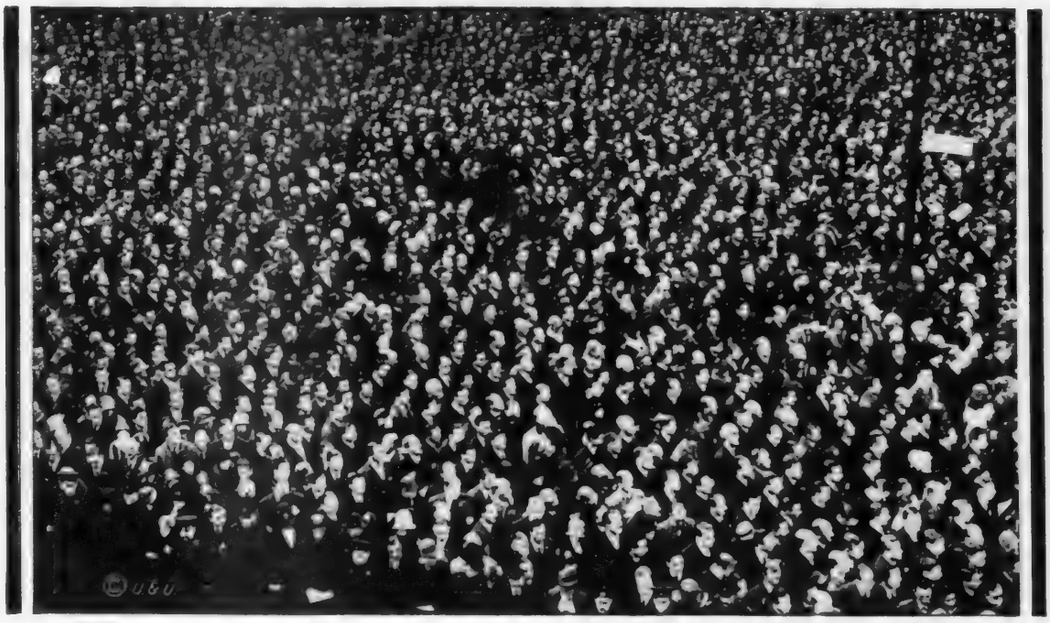
### EXPANSION SHELLS
Phillips Drill Co., Chicago, Ill.

### FANS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

### FANS, DISC PRESSURE
DeBothezat Impeller Co., Inc., New York.

### FANS, SUPPLY AND EXHAUST
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Emerson Electric Mfg. Co., St. Louis, Mo.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

### FEEDERS, BOILER
Cashin Co., W. D., Boston, Mass.
Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Walworth Co., New York.



# If

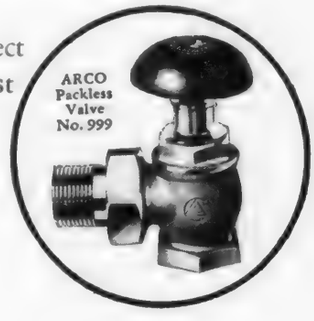
all of these people were placing orders with you for steam heating jobs, you could sell every one of them Arco Packless Valves No. 999. You could make the sale every time if you took five short minutes with each person and simply pointed out:

That Arco Packless Valves never need repacking, and are therefor, in the long run, less expensive than old style packed valves that must be repacked periodically—

That there is no danger of leaks which often cause costly damage to floor and rugs, for Arco Packless Valves are guaranteed not to leak—

That there is no need to turn and turn and struggle with handles that stick and bind, for Arco Packless Valves open with one smooth turn of a handle that is never hot.

When buyers know the facts, they will always select Arco Packless Valves in preference to the cheapest packed valves made.




*Arco Packless Valve No. 999—Made in angle, corner and globe patterns, round or lever handle—for steam, water, vapor or vacuum installations.*

## AMERICAN RADIATOR COMPANY

40 WEST 40th STREET ACCESSORIES DIVISION PV-712 NEW YORK, N. Y.

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Davis Engineering Corp., New York.

**FILTERS, CRANK CASE OIL**
Nugent & Co., Inc., Wm. W., Chicago, Ill.

**FILTERS, FEED-WATER**
Davis Engineering Corp., New York.

**FITTINGS, ACID RESISTING**
Duriron Company, Inc., The, Dayton, O.

**FITTINGS, COMPRESSION PIPE**
Nugent & Co., Inc., Wm. W., Chicago, Ill.

**FITTINGS, FLANGED**
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Walworth Co., New York

**FLANGES**
Clow & Sons, James B., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Walworth Co., New York

**GAS BURNERS**
Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.

**GASKETS, ASBESTOS**
Jenkins Bros., New York.
Johns-Manville Corp., New York.

**GASKETS, METALLIC**
Jenkins Bros., New York.

**GASKETS, RUBBER**
Jenkins Bros., New York.

**GAUGE BOARDS**
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Clow & Sons, James B., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

**GAUGE GLASSES**
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Jenkins Bros., New York.

**GAUGES, ALTITUDE**
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.

**GAUGES, DRAFT**
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

**GAUGES, HYDRAULIC**
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

**GAUGES, OUNCE GRADUATED**
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

**GAUGES, PRESSURE**
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

**GAUGES, TANK**
King-Seeley Corp., Ann Arbor, Mich.

**GAUGES, VACUUM**
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

**GAUGES, VACUUM (COMPOUND)**
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

**GAUGES, WATER**
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

**GENERATOR COOLING SYSTEMS**
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Reed Air Filter Co., Inc., Louisville, Ky.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

**GOVERNORS, (PUMP)**
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Webster & Co., Warren, Camden, N. J.

**GRATES, DUMPING**
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio
Titusville Iron Works Co., The, Titusville, Pa

**GRATES, ROCKING**
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.

**GRATES, SHAKING**
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

**GRATES, SHAKING AND DUMPING**
Frost Mfg. Co., Galesburg, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

**GRATES, SHAKING, CIRCULAR**
Fitzgibbons Boiler Co., Inc., New York.
Pyramid Iron Products Corp., New York.
Titusville Iron Works Co., The, Titusville, Pa.

**GRATES, STATIONARY**
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

**HEAT CABINETS**
Circulair Heat, Inc., Louisville, Ky.
Clow & Sons, James B., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Metal Stamping Co., Long Island City.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Trane Co., The, LaCrosse, Wis.

**HEATERS, AIR, FAN SYSTEM**
Aerofin Corp., Newark, N. J
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

**HEATERS, DOMESTIC WATER**
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Excelso Products Corporation, Buffalo, N. Y.
Foster Wheeler Corporation, New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
Monitor Boiler Co., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., The, Erie, Pa.
Titusville Iron Works Co., The, Titusville, Pa.
Weil-McLain Co., Chicago, Ill.
Whitlock Coil Pipe Co., Hartford, Conn.

**HEATERS, ELECTRICAL UNIT**
American Blower Co., Detroit, Mich.

**HEATERS, FEED WATER, (CLOSED)**
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Foster Wheeler Corporation, New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Frost Mfg. Co., Galesburg, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Whitlock Coil Pipe Co., Hartford, Conn.

**HEATERS, FEED WATER, (OPEN)**
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Webster & Co., Warren, Camden, N. J.

**HEATERS, FUEL-OIL**
Alberger Heater Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Davis Engineering Corp., New York.
Electrol, Inc., St. Louis, Mo.
Excelso Products Corporation, Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Heat Transfer Products, Inc., New York
National Air Filter Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Titusville Iron Works Co., The, Titusville, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

**HEATERS, UNIT**
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
Erie Heating Systems, Inc., Erie, Pa.
McQuay Radiator Corp., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilation Co., Inc., Bridgeport, Conn.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

**HEATING SYSTEMS, GAS**
Clow & Sons, James B., Chicago, Ill.

**HEATING SYSTEMS, VACUUM**
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Spencer Heater Co., Williamsport, Pa.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J

**HEATING SYSTEMS, VAPOR**
American District Steam Co., North Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J

**HEATING SYSTEMS, WATER**
American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland Ohio.
Grinnell Co., Providence, R. I.
Hornung, J. C., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Spencer Heater Co., Williamsport, Pa.
Thrush & Co., H. A., Peru, Ind.

**HUMIDIFIERS**
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Grinnell Co., Providence, R. I.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
Midwest Air Filters, Inc., Bradford, Pa.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Phila., Pa.

**HUMIDITY CONTROL**
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Foxboro Co., Inc., The, Foxboro, Mass.
Grinnell Co., Providence, R. I.
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.

**INSTRUMENTS, ELECTRIC MEASURING**
Bristol Co., The, Waterbury, Conn.

**INSTRUMENTS, INDICATING AND RECORDING**
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

**INSULATION, BOILER, PIPE, ETC.**
(See Covering, Boiler, Pipe, etc.)

**INSULATION, BUILDING**
Banner Rock Products Co., Alexandria, Ind.
Flax-li-num Insulating Co., St. Paul, Minn.
Insulite Co., Minneapolis, Minn.
Johns-Manville Corp., New York.

**MANOMETERS**
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American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass

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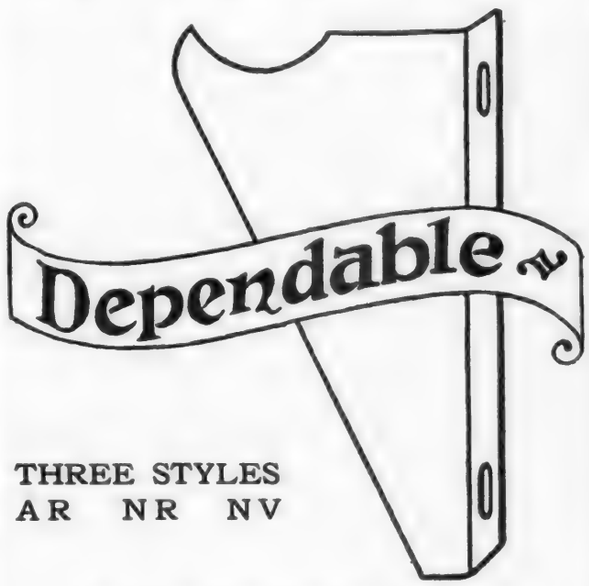


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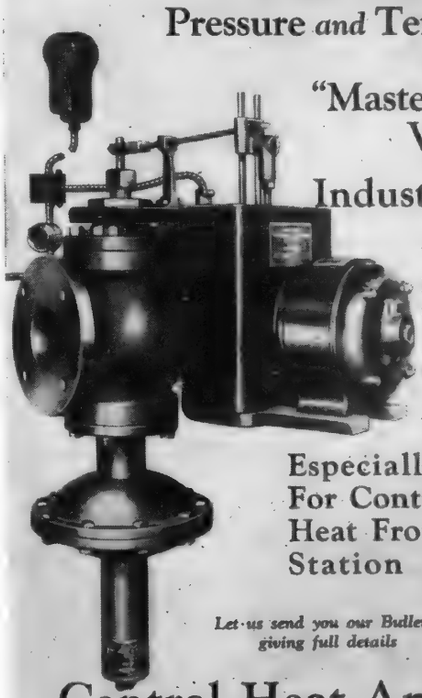

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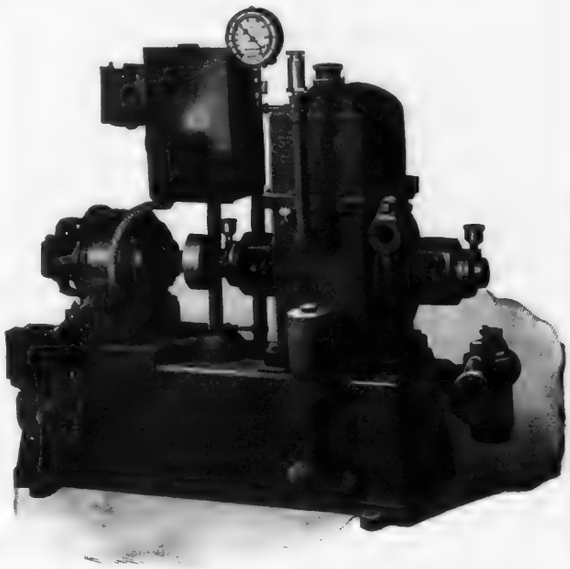

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DeBothezat Impeller Co., Inc., New York
Mason Regulator Co., Boston, Mass.
New York Blower Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

**METALS, THERMOSTATIC**
Chace Valve Co., W. M., Detroit, Mich

**METERS, CONDENSATION**
American District Steam Co., North Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.

**METERS, FEED WATER**
Central Station Steam Co., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

**METERS, FLOW**
Foxboro Co., Inc., The, Foxboro, Mass.
Spray Engineering Co., Boston, Mass.

**METERS, PITOT TUBE**
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.

**METERS, STEAM**
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Builders Iron Foundry, Providence, R. I.

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Baldor Electric Co., St. Louis, Mo.
Century Electric Co., St. Louis, Mo.
Emerson Electric Mfg. Co., St. Louis, Mo.
Janette Mfg. Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

**NOZZLES, ACID RESISTING**
Duriron Company, Inc., The, Dayton, O.

**NOZZLES, SPRAY**
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Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

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American Nokol Corp., Chicago, Ill.
Cleveland Steel Products Corp., Cleveland, Ohio
Electrol, Inc., St. Louis, Mo.
Hardinge Bros., Inc., Chicago, Ill.
Johnson Co., S. T., Oakland, Cal.
McIlvaine Burner Corporation, Chicago, Ill.
Pascoe Company, The Wm. H., Chicago, Ill.
Petroleum Heat & Power Co., New York.
Preferred Oil Burners, Inc., Peoria, Ill.

**OIL BURNER EQUIPMENT**
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Draft-A-Justor Corp., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Johnston Brothers, Inc., Ferrysburg, Mich.
Schutte & Koerting Co., Philadelphia, Pa.
Webster Electric Co., Racine, Wis.

**OIL BURNER IGNITION AND CONTROL EQUIPMENT**
Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Webster Electric Co. Racine, Wis.
White Mfg. Co., St. Paul, Minn.

**PIPE, ACID RESISTING**
Duriron Company, Inc., The, Dayton, O.

**PIPE, CAST IRON**
Clow & Sons, James B., Chicago, Ill.

**PIPE, STEEL**
Clow & Sons, James B., Chicago, Ill.
National Tube Co., Pittsburgh, Pa.

**PIPE, WOOD**
Wyckoff & Son Co., A., Elmira, N. Y.

**PIPE BENDING**
Badger & Sons Co., E. B., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York
Whitlock Coil Pipe Co., Hartford, Conn.

**PIPE CASING (WOOD)**
American District Steam Co., North Tonawanda, N. Y.
Wyckoff & Son Co., A., Elmira, N. Y.

**PIPE HANGERS**
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Walworth Co., New York

**PIPE THREADING & CUTTING MACHINES**
National Pipe Bending Co., New Haven, Conn.

**PRESSURE REDUCING VALVES**
(See Regulators, Pressure).

**PULLEYS, VARIABLE SPEED**
Horton Mfg. Co., Minneapolis, Minn.

**PUMPS, ACID RESISTING**
Duriron Company, Inc., The, Dayton, O.

**PUMPS, CENTRIFUGAL**
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Foster Wheeler Corporation, New York.
Nash Engineering Co., So. Norwalk, Conn.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

**PUMPS, CENTRIFUGAL, VACUUM HEATING**
Ames Pump Co., New York.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

**PUMPS, CONDENSATION**
American Steam Pump Co., Battle Creek, Mich.
Ames Pump Co., New York.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Eclipse Fuel Engineering Co., Rockford,
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

**PUMPS, OIL**
Connor Co., Inc., The W. B., New York.
Janette Mfg. Co., Chicago, Ill.
Nugent & Co., Inc., Wm. W., Chicago, Ill.

**PUMPS, RECIPROCATING STEAM**
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.

**PUMPS, SUMP**
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Weil Pump Co., Chicago, Ill.

**PUMPS, TURBINE**
Chicago Pump Co., Chicago, Ill.
Foster Wheeler Corporation, New York.
Nash Engineering Co., So. Norwalk, Conn.

**PUMPS, VACUUM**
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Foster Wheeler Corporation, New York.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

**RADIATOR ENCLOSURES OR SHIELDS**
Acme Radiator Shield Co., Cincinnati, Ohio.
American Metal Products Corp., St. Louis, Mo.

**RADIATOR HANGERS**
American Radiator Co., Buffalo, N. Y.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Co., St. Paul, Minn.
Kewanee Boiler Corp., Kewanee, Ill.
McAlear Mfg. Co., Chicago, Ill.

**RADIATORS, BRASS**
Circulair Heat, Inc., Louisville, Ky.
Rome Brass Radiator Corp., New York.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.

**RADIATORS, GAS HEATED**
Automatic Gas Steam Radiator Co., Pittsburgh, Pa.
Clow & Sons, James B., Chicago, Ill.

**RADIATORS, STEAM & WATER**
American Radiator Co., Buffalo, N. Y.
Burnham Boiler Corp., Irvington, N. Y.
Clow & Sons, James B., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
National Radiator Corp., Johnstown, Pa.
Nelson Corp., Herman, The, Moline, Ill.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.

**RECEIVERS, AIR**
Brownell Co., The, Dayton, Ohio.
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

**RECEIVERS, CONDENSATION**
American District Steam Co., North Tonawanda, N. Y.
American Steam Pump Co., Battle Creek, Mich.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

**REGULATORS, BOILER-FEED**
Atlas Valve Co., Newark, N. J.
Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

**REGULATORS, DAMPER**
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Atlas Valve Co., Newark, N. J.
Draft-A-Justor Corp., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Regulator Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Sheer Co., H. M., Quincy, Ill.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, LaCrosse, Wis.
White Mfg. Co., St. Paul, Minn.
Wing Mfg. Co., L. J., New York.

**REGULATORS, PRESSURE**
American District Steam Co., North Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kainer & Company, Chicago, Ill.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Teeple Co., L. R., Portland, Oregon

**REGULATORS, TEMPERATURE**
(See Temperature Control).

**SEPARATORS, OIL**
Bishop & Babcock Sales Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster & Co., Warren, Camden, N. J.

**SEPARATORS, STEAM**
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Webster & Co., Warren, Camden, N. J.

**SPRAY COOLING SYSTEMS**
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

**SPRAY NOZZLES**
(See Nozzles, Spray).

**STRAINERS, OIL**
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Nugent & Co., Inc., Wm. W., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia Pa.

**STRAINERS, STEAM**
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia Pa.

**STRAINERS, WATER**
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis
Ross Heater & Mfg. Co., Buffalo, N. Y
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.

**TEMPERATURE CONTROL**
Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The, Foxboro, Mass.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill
Kieley & Mueller, Inc., New York.
Mercoid Corporation, Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Raymond, F. I., Chicago, Ill.
Sarco Co., Inc., New York.
Sheer Co., H. M., Quincy, Ill.
Sterling Engineering Co., Milwaukee Wis.
Teeple Co., L. R., Portland, Oregon
Thrush & Co., H. A., Peru, Ind.
Time-O-Stat Corp., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
White Mfg. Co., St. Paul, Minn.

**THERMOMETERS, RECORDING & INDICATING**
American Radiator Co., Buffalo, N. Y
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
National Radiator Corp., Johnstown, Pa
Pierce, Butler & Pierce Mfg. Corp., New York

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• *Booth No. 82, Chicago Power Show, February 12-16, 1929*

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436 MILWAUKEE AVE. CHICAGO, ILL.

Balanced Valve Pressure Regulator Steam Trap Back Pressure Valve
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Butterfly Valve Float Box with Control Valve

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*Designers and builders of general engineering equipment for*

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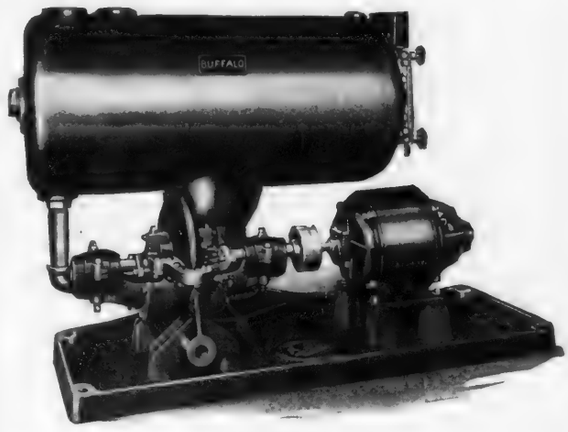


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Buffalo Double Suction Class "SL" Pumps and Receivers are made to pump 212° condensate without vaporizing, air binding, reduction in capacity or pressure and various other troubles that prevail in other condensate pumps.

High or low water temperatures, either above or below normal, do not overload these smooth running pumps. Absolutely self-priming. Made in several sizes, for all motor speeds with capacities up to 12,500 lbs. of condensate per hour against heads up to 50 lbs.

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Pittsburgh
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San Francisco
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St. Louis
Toledo
Washington

IN CANADA
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Powers Regulator Co., Chicago, Ill.

### THERMOSTATS

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Johnson Service Co., Milwaukee, Wis.
Mercoid Corporation, Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Sheer Co., H. M., Quincy, Ill.
Thrush & Co., H. A., Peru, Ind.
Time-O-Stat Corp., Milwaukee, Wis.
White Mfg. Co., St. Paul, Minn.

### TRAPS, BUCKET

Trerice Co., H. O., Detroit, Mich.

### TRAPS, FLOAT

Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Sarco Co., Inc., New York.

### TRAPS, FLOAT & THERMOSTATIC

Dunham Co., C. A., Chicago, Ill.

### TRAPS, INVERTED BUCKET (STEAM AND AIR)

Armstrong Machine Works, Three Rivers, Mich.

### TRAPS, LIFTING

Lytton Mfg. Corp., Franklin, Va.

### TRAPS, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
Armstrong Machine Works, Three Rivers, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville Corp., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

### TRAPS, RETURN

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

### TRAPS, STEAM

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Davis Engineering Corp., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Trerice Co., H. O., Detroit, Mich.

### TRAPS, VACUUM

American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

### TUBING, COPPER AND BRASS

Wolverine Tube Co., Detroit, Mich.

### TURBINES, STEAM

Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

### TURBO-BLOWERS

Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

### UNDERGROUND PIPE CONDUITS

American District Steam Co., North Tonawanda, N. Y.
Johns-Manville Corp., New York.
Ric-wiL Co., The, Cleveland, Ohio.
Wyckoff & Son Co., A., Elmira, N. Y.

### VACUUM CLEANING APPARATUS

American Radiator Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

### VALVES, ACID RESISTING

Duriron Company, Inc., The, Dayton, O.

### VALVES, AIR, AUTOMATIC

American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Kelly Brass Works, Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Russell & Co., W. A., New York.

### VALVES, AIR RELIEF

American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Gorton Heating Corporation, New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Stay-Rite Co., Inc., Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.

### VALVES, BACK PRESSURE

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

### VALVES, BALANCED

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.

### VALVES, BLOW-OFF

Jenkins Bros., New York.
Lytton Mfg. Corp., Franklin, Va.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

### VALVES, CHECK

Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Milwaukee Valve Co., Milwaukee, Wis.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

### VALVES, FLOAT

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.

### VALVES, GATE

American District Steam Co., North Tonawanda, N. Y.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York.

### VALVES, GLOBE, ANGLE & CROSS

Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Phila., Pa.
Walworth Co., New York.

### VALVES, HYDRAULIC-OPERATING

Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Walworth Co., New York

### VALVES, MAGNETIC

Absolute Con-Tac-Tor Corp., Elkhart, Ind.

### VALVES, NON-RETURN

Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

### VALVES, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Capitol Brass Works, Detroit, Mich.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Walworth Co., New York
Webster & Co., Warren, Camden, N. J.

### VALVES, REDUCING

(See Regulators, Pressure).

### VALVES, REGULATING

Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kainer & Company, Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Walworth Co., New York

### VALVES, RELIEF (WATER)

American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Kainer & Company, Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Thrush & Co., H. A., Peru, Ind.

### VALVES, SAFETY

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Jenkins Bros., New York.
National Radiator Corp., Johnstown, Pa.
Stay-Rite Co., Inc., Cleveland, Ohio.
Walworth Co., New York

### VALVES, STOP AND CHECK

(See Valves, Non-Return).

### VENTILATING SYSTEMS

American Blower Co., Detroit, Mich.
American Radiator Co., Buffalo, N. Y.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Lakeside Company, The, Hermansville, Mich.
Nelson Corp., Herman, The, Moline, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

### VENTILATING SYSTEMS, ACID

Duriron Company, Inc., The, Dayton, O.

### VENTILATORS

Bayley Blower Co., Milwaukee, Wis.
DeBothezat Impeller Co., Inc., New York
Midwest Air Filters, Inc., Bradford, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

### VENTILATORS, MUSHROOM

Aeolus Dickinson, Chicago, Ill.
American Blower Co., Detroit, Mich.
American Metal Products Corp., St Louis, Mo.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Knowles Mushroom Ventilator Co., New York.
Ventilating Products Co., Chicago, Ill

### VENTILATORS, ROOF

Aeolus Dickinson, Chicago, Ill.

### VENTILATORS, UNIT

American Blower Co., Detroit, Mich.
Nelson Corp., Herman, The, Moline, Ill.
Peerless Unit Ventilation Co., Inc., Bridgeport, Conn.
Sturtevant Co., B. F., Hyde Park Boston, Mass.

### WATER STERILIZERS

Clow & Sons, James B., Chicago, Ill

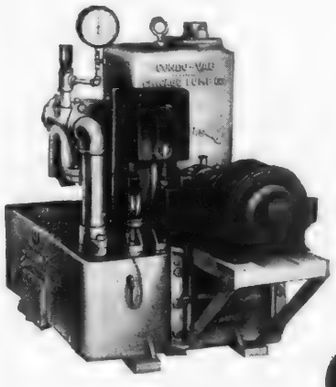
### WEATHER STRIPS, METAL

Athey Co., Chicago, Ill.

### WRENCHES, STILLSON

Walworth Co., New York.

## In the winter CONDO-VAC is the thing!



CONDO-VAC

Condensation Vacuum Pump
Fig. 1990

Heating Contractors and Engineers have made "Condo-Vac" a favorite by their own prescription.

Simplicity of installation, simplicity of operation and simplicity in maintenance are designed and built in the "Condo-Vac."

"Condo-Vac" needs no pit for installation—base and receiver are one. Air impeller and water impeller are on one shaft, and turned over by one motor.

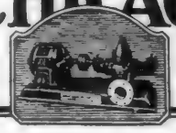
Operation is controlled by vacuum regulator and a float switch.

"Condo-Vac" is designed for efficient service and long life.

"Condo-Vac" is a complete unit, connected up and ready-to-work as it leaves the factory.

Heating men are specifying "Condo-Vac" because it is made to their specification.

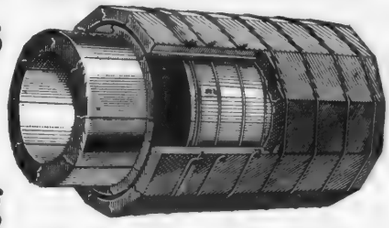
**CHICAGO PUMP COMPANY**



SEWAGE-CONDENSATION-CIRCULATING
BILGE-FIRE-HOUSE-VACUUM

2336 Wolfram St., CHICAGO. Phone, Brunswick 4110
79 Madison Ave., NEW YORK. Phone, Ashland 2220

## Wyckoff's Improved Cypress Covering



**Lasts as Long as The Pipe Itself**

**As well as being highly efficient in its application, Wyckoff Improved Cypress Steam Pipe Covering withstands all conditions attending steam pipe trenches. All engineers who know Wyckoff Pipe covering specify it because it lasts.**

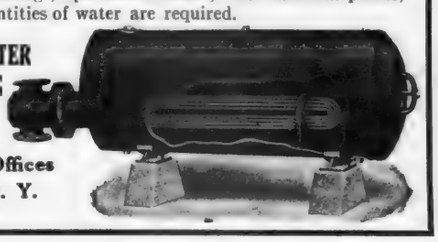
A. WYCKOFF & SON CO. ELMIRA, N. Y.

## Liberal Heating Surface

All U-Tube Storage Heaters have liberal heating surface of commercially pure copper tubing in which all the bends are 1¼-inch No. 16 Stubbs Gauge. It is not our practice to use No. 16 gauge in the small radius bends that are difficult to form, and the remainder of the bundle of lighter-gauge tubing.

O. E. F. Storage Heaters are used in clubs, schools, hospitals, laundries, office buildings, apartment houses, and industrial plants, wherever large quantities of water are required.

**O. E. FRANK HEATER & ENGINEERING CO., Inc.**



**Factory and Offices at Buffalo, N. Y.**

## WEIL PUMPS *For Better Service*

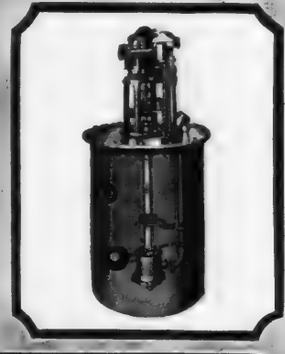


Fig. NRG 2001. "Weil" Type NRG Vertical Condensation Pump and Receiver. Occupies small space. Concrete pit unnecessary.

**Write for Bulletin NRG 200.**

**Few Agencies Still Open**

**WEIL PUMP COMPANY**

BILGE-SEWAGE FIRE-HOUSE CIRCULATING

BOILER FEED CONDENSATION VACUUM

**Manufacturers of Better Centrifugal Pumps**
215-17 W SUPERIOR ST., CHICAGO

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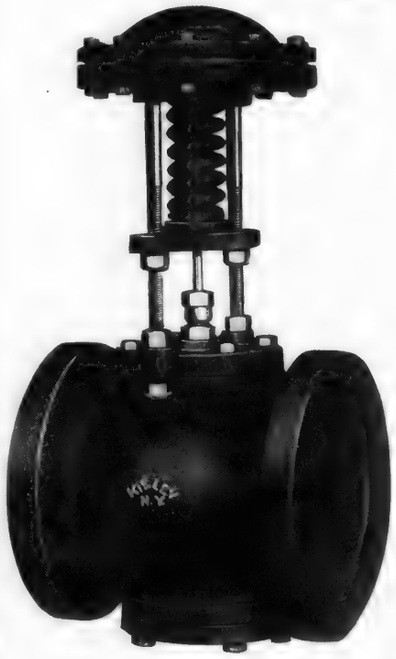
KIELEY



KIELEY PRESSURE REGULATING VALVES

have a reputation for Dependability.

Simplicity of construction, with a minimum of parts, insures service.

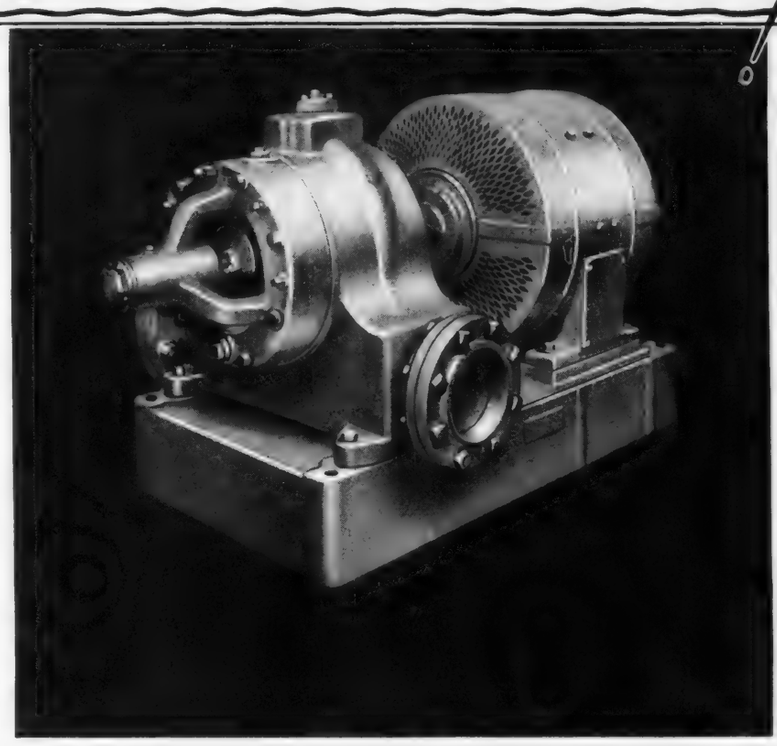
Every Kieley Specialty is rigidly inspected under pressure and operating conditions as near as possible to its actual application by the Purchaser.

*Visit our Booths, 281-282, New York Power Show*

KIELEY & MUELLER, Inc.

34 West 13th St., New York City

# For suction lift without a foot valve



Jennings Centrifugal Pumps are recommended for circulating hot and cold water; boosting city water pressure; handling water in air washing and conditioning; removing condensate from heating systems, blow down from soot blowers and superheaters; exhaust drips from steam ejector air pumps and other auxiliaries; pumping refrigerator can and core water, evaporator feed, cooling tower and condenser water, screen wash water, oil engine jacket water, ash sluicing water.

## You can rely on this centrifugal

*For delivering full rated capacity at starting without delay*
*For dependable service where water level is likely to fall*
*Where air or gas is handled with water being pumped*
*For intermittent operation without a foot valve*

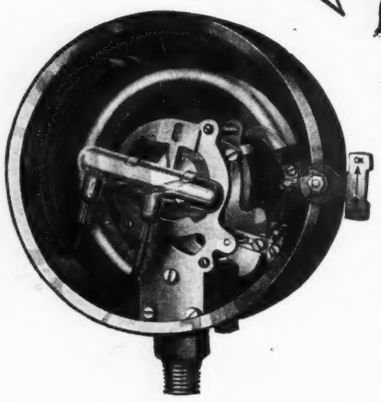
Jennings Suction Centrifugal Pumps, with built-in Nash Vacuum Pump for exhausting air from casing and suction piping, are furnished in 2, 3, 4 and 6 in. sizes for capacities up to 1000 g. p. m. Heads up to 130 ft. Either bronze fitted or all bronze construction.

# Jennings Pumps

THE NASH ENGINEERING CO 81 WILSON ROAD, SOUTH NORWALK CONN.

# MERCURY TO MERCURY
## switching by MARSH

See Jas. P. Marsh & Co.'s Exhibit booth 295 mezzanine floor. The 7th National Exposition of Power and Mechanical Engineering at GRAND CENTRAL PALACE New York City DEC. 3rd to 8th, 1928



## *The New Marsh Merkustat*

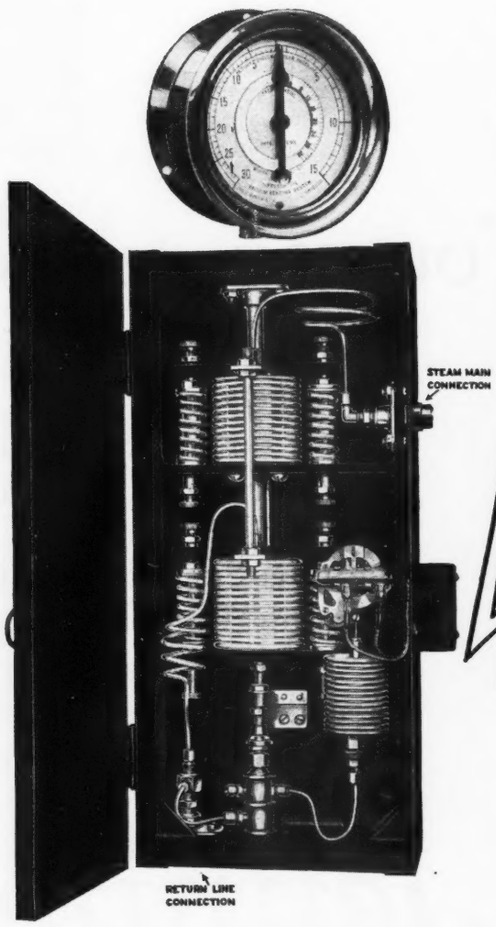
**An automatic motor starting and stopping instrument employing mercury to mercury contacting means actuated by something new and revolutionary in instantaneous impulsing.**

# PLUS

## *The New Marsh Hi-Lo*

Vacuum Heating system employing the Marsh *governor* which keeps the vacuum pump 2 in. ahead of the boiler at all times.

This *governor* incorporates the Marsh mercury to mercury instant impulse Merkustat in addition to the Marsh *direct reading differential gauge* proving the system always correct.

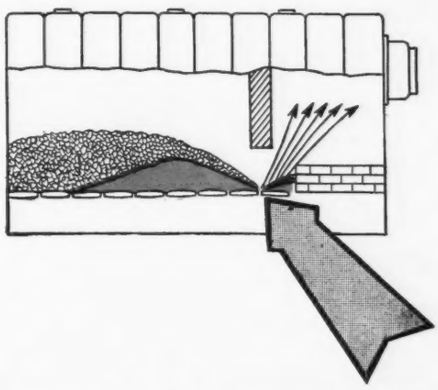



Introduction of the new Marsh Hilo radiator trap in addition to a most complete line of automatic air valves, air eliminating devices, industrial thermometers, boiler return traps, indicating and recording gauges, pressure and vacuum gauges, gauge panel boards of "Silitac" and the kindred heating specialties—Marsh packless influx radiator valves and Marsh reflux radiator traps.

## JAS. P. MARSH & CO

2073 Southport Ave., Chicago, U. S. A.

*Offices in Principal Cities*



*Yes!*

# The fire has burned through

## ... *the boiler has stopped steaming*

The illustration tells the story. Fire has burned through, leaving a small section of grates uncovered, and cold air is rushing through. Instantly the boiler stops steaming. *Fire needs attention!*

The Weil-McLain Smokeless Boiler has no thin point in the fire bed, located under or behind a hanging arch, to quickly burn through and require frequent attention.

Instead, there is a uniformly deep, heavy fuel bed, which will keep all grates well covered for many hours. No short firing periods. No special firing. No special kinds of fuel.

This is a modern smokeless boiler improvement of the most important nature. The complete facts are given in two interesting booklets. Write for them.

*Catalog on Weil-McLain Smokeless, Long-Firing-Period Boilers; also booklet on "Grate Vairea," gladly mailed on request.*

WEIL-McLAIN COMPANY

| General Offices | Boiler Factory | Radiator Factory |
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| Chicago, Illinois | Michigan City, Indiana | Erie, Pa. |

*Smokeless*

# Weil-McLain

SCIENTIFIC COMBUSTION

# BOILERS

**SMOKELESS BOILERS with LONGER FIRING PERIODS**

# IT PAYS TO VACUUMIZE

## Those one-pipe steam heating systems

Tell your customer—"To vacuumize your system is to lock out air, the element that robs the boiler of its ability to deliver all its heat. Mortal enemies—air and steam. Air destroys steam, takes away its heat. Get that air out and lock it out with Hoffman No. 2 Vacuum Valves—and the steam won't have to fight every inch of its way into radiators (pushing out air, lifting air's weight) every time drafts are opened.

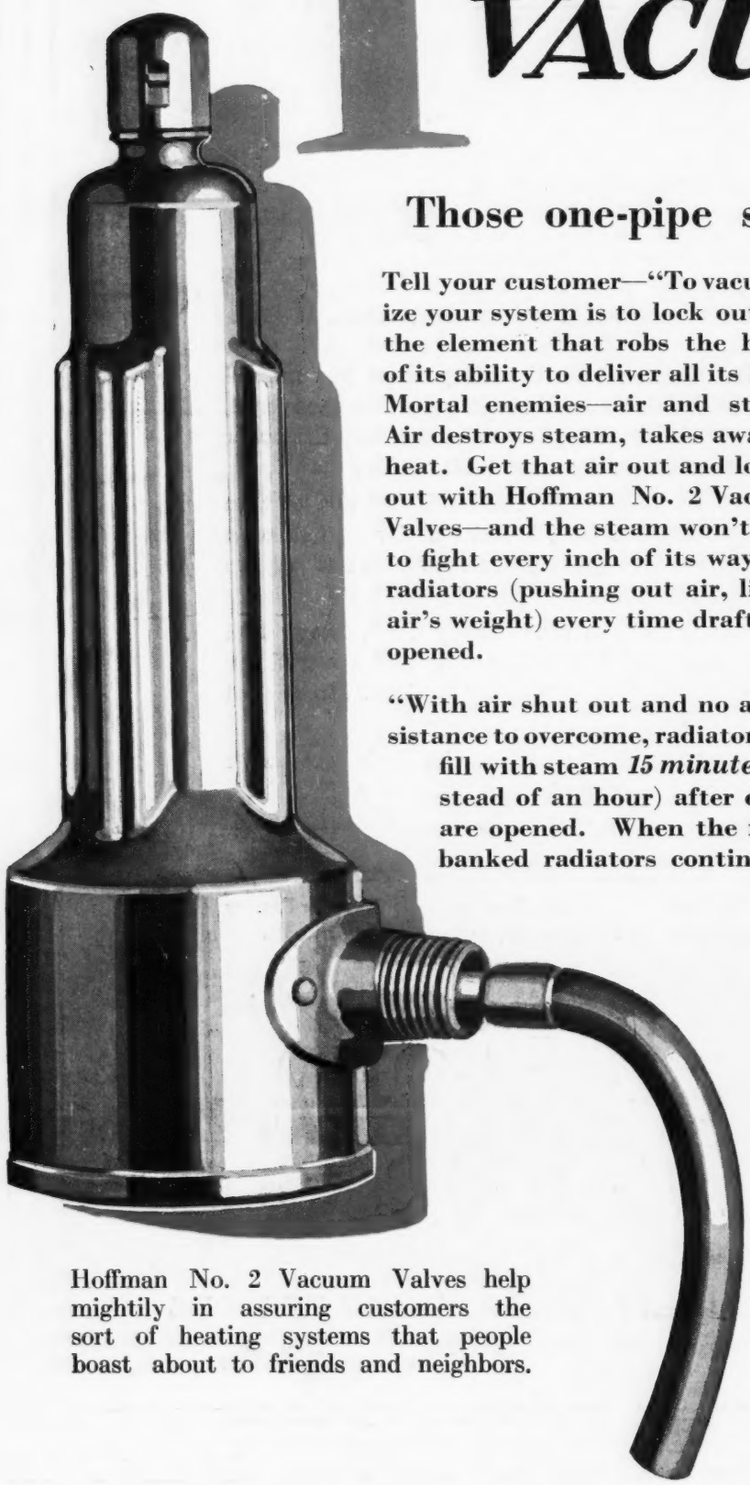
"With air shut out and no air resistance to overcome, radiators will fill with steam *15 minutes* (instead of an hour) after drafts are opened. When the fire is banked radiators continue to give off heat for *3 hours* (instead of 30 minutes), because air cannot get in to dissipate it.

"What comfort this one simple change can bring! How easy it is to figure out the number of dollars saved in fuel!"

Long after your customer has paid and forgotten your bill, he'll remember the comfort you've given him, the fuel you've saved him. People gossip about these things. And that sort of thing builds business for the heating contractor.

**HOFFMAN SPECIALTY CO., INC.**
Dept. C-45
25 West 45th Street New York City

*Makers of the "Watchman-of-the-Coal-Pile" Air Valves and Hoffman Controlled Heat*



Hoffman No. 2 Vacuum Valves help mightily in assuring customers the sort of heating systems that people boast about to friends and neighbors.

**THE HOFFMAN TEAPOT TEST**

Photograph above shows the famous Hoffman "glass teapot test." Illustration shows how, after a vacuum has been originally formed, the lighting of a single match will start the teapot boiling again.